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MEDICAL ENTOMOLOGY STUDIES - IV.

THE SUBGENERA *INDUSIUS* AND *EDWARDSAEDES*
OF THE GENUS *Aedes* (DIPTERA: CULICIDAE).

by

John F. Reinert

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MEDICAL ENTOMOLOGY STUDIES - IV.

THE SUBGENERA *INDUSIUS* AND *EDWARDSAEDES* OF THE GENUS *AEDES* (DIPTERA: CULICIDAE)¹.

By

John F. Reinert²

ABSTRACT

The subgenera *Indusius* Edwards and *Edwardsaedes* Belkin are redescribed and compared to other subgenera of the genus *Aedes* Meigen. Species assigned to the subgenera are fully illustrated and described. An analysis of the variation in setal branching in larvae and pupae of *imprimens* (Walker) is presented. *Aedes suknaensis* (Theobald) is returned to synonymy with *imprimens*.

INTRODUCTION

The monotypic subgenus *Indusius* of the genus *Aedes* Meigen was described by Edwards in Barraud (1934) and he included in it a single species, *pulverulentus* Edwards. Two males were doubtfully included by him with females of *pulverulentus* on page 269 but later (page 445) assigned by him with little doubt to this species. He based the subgenus primarily on the marked sexual dimorphic features of the male which readily distinguished it from other *Aedes*; however, he could not find any definite features with which to distinguish the female from other subgenera of the genus. The subgenus has not been treated in the published literature since its original designation except very briefly in a key by Mattingly (1961) and lists by Horsfall (1955) and Singh (1974). *Aedes pulverulentus* also has not been reported since its inclusion in *Indusius* except by Aslamkhan (1971) in a list of mosquito species from Pakistan.

Edwardsaedes, also a monotypic subgenus of the genus *Aedes*, was described by Belkin in 1962. The type species, *imprimens*, however, had been assigned to several different subgenera of *Aedes* since its original placement in the genus *Culex* Linnaeus by Walker (1860) and these are as follows: *Ochlerotatus* Lynch Arribalzaga; *Aedimorphus* Theobald (= *Ecculex* Felt); and *Neomelaniconion* Newstead (= *Banksinella* Theobald).

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The present study redescribes the subgenera *Indusius* and *Edwardsaedes* and presents characters which separate each, in all the known stages, from the other subgenera of *Aedes*. The single species included in *Indusius*, *pulverulentus*, and the single known species of *Edwardsaedes*, *imprimens*, are fully described and illustrated. Tables 1 and 2 list the range and mode of the setal branching of the pupae and larvae of *imprimens*.

Many previously unstudied specimens of *imprimens* were examined during this review. These specimens expanded the known range of *imprimens* and filled in some gaps in the reported distribution of the species. Little material of *pulverulentus* was available for study and most specimens were in very poor condition. All specimens of this species examined were collected from 1911 to 1927 with the exception of 3 females which were taken in 1970 by M. Aslamkhan, Pakistan Medical Research Center, Lahore, Pakistan.

Abbreviations used in references to literature conform to the BIOSIS List of Serials, Biosciences Information Service of Biological Abstracts, Philadelphia, 1972. In the synonymy section, an asterisk following the abbreviations used (A = adult, ♀ = female, ♂ = male, P = pupa, L = larva, E = egg) indicates that at least some portion of that sex or stage is figured. In the distribution section abbreviations used are the same as in the synonymy but with the following 2 additions, p = pupal skin and l = larval skin. Ten specimens were used in determining the range and mode of the setal branching in pupal and larval descriptions and tables. In the pupal description and table the number of branches on abdominal seta 1-I was measured on the basal third of the seta. Measurements on the illustrations are in millimeters. Distribution records are indicated as follows: countries are in capital letters, provinces and primary administrative divisions are in italics, and place names have the first letter capitalized. The number of specimens examined from each province follows the last place name of the province in the distribution section. The spelling of provincial and locality names was taken from the following Official Standard Names Gazetteers prepared by the Geographic Names Division, U. S. Army Topographic Command and the Office of Geography, U. S. Department of the Interior: India (vols. I and II, 1952); Indonesia (1968); Japan (1953); Malaysia (1970); Pakistan (1962); Philippine Islands (vols. I and II, 1953); South Vietnam (1971); and Thailand (1966). Locality names which did not appear in the gazetteers were spelled according to the collection data sheets and labels on the specimens.

Information in the bionomics and distribution sections was taken from the collection data sheets, specimen labels and the published literature.

Nomenclature and chaetotaxy used for the female, male, male genitalia, pupa and larva follow Knight (1970, 1971), Knight and Laffoon (1970a, 1970b, 1971a, 1971b) and Laffoon and Knight (1973). The terminology of the female genitalia follows Reinert (1974a).

GENUS *Aedes* MEIGEN

SUBGENUS *INDUSIUS* EDWARDS

Type species: *Aedes pulverulentus* Edwards

Aedes (Indusius) Edwards, in Barraud 1934: 268, 445.

FEMALE. *Head*. Pedicel of antenna with a few small scales and short

fine hairs mesally; vertex covered with broad decumbent scales, erect and narrow scales absent; occiput with a few short erect forked scales; eyes widely separated; interocular space covered with broad scales and interocular setae well developed. *Thorax*. Scutum covered with narrow curved scales; scutellum with broad and narrow scales; acrostichal area with a few setae on anterior area, setae absent on posterior area; dorsocentral area with a few setae on anterior area and numerous ones on posterior area; scales present on antep pronotum, postpronotum, propleuron, subspiracular area, postspiracular area, mesepisternum and mesepimeron but absent on prosternum, paratergite, mesomeron and metameron; postpronotum with a number of posterior setae; propleuron with 6-10 setae; mesepimeron without lower setae. *Legs*. Femora I-III short and somewhat thickened; tibiae I-III with numerous erect stout dark setae, very noticeable on III; posttarsi I and II with unguis equal in size, each with a tooth, III with unguis equal in size, both simple. *Wing*. Alula with a number of very long narrow scales along margin (scales similar to setae on upper calypter); remigium without setae. *Genitalia*. Segment VIII completely retracted into segment VII; tergum VIII without scales; sternum VIII with a deep median apical indentation, scales absent or only a very few present, setae 1-3-S all basad; tergum IX consists of 2 long plates which are expanded apically, each with several setae; insula tongue-like with a very few small tuberculi; lower vaginal sclerite absent; upper vaginal sclerite well developed, heavily pigmented; postgenital lobe with a moderately deep median indentation; cerci moderately long, scales absent; 3 seminal capsules, one large and 2 medium sized ones.

MALE. *Head*. Antenna slightly plumose, noticeably longer than proboscis; maxillary palpus approximately equal in length to proboscis, 4-segmented, basal 2 segments short, segment 3 long and approximately one half length of apical segment which is long and swollen, with numerous short setae; proboscis short, apical half swollen and somewhat flattened, numerous long setae on lateral and ventral areas, length shorter than length of femur I, labellum large. *Legs*. Posttarsi I and II each with 2 unguis, empodium large, I with unguis large, simple and equal in size, II with unguis large, unequal in size, larger one with a tooth, smaller one simple. *Abdomen*. Terga with several short setae, mostly along lateral and posterior margins. *Genitalia*. Tergum IX with apex convex, several short setae on each side of midline; gonocoxite moderately long, broad, somewhat conical, ventral surface with several long setae on basal portion and a number of short ones scattered over remainder of area, distal 0.6 covered with a pile of long hair-like spicules; gonostylus short, broad, with file-like ridges and stout spicules, attached subapically to gonocoxite; proctiger short with paraproct divided into 2 narrow arms and a broader basal area, cercus membranous without cercal setae; phallosome with parameral apodeme moderately long, broad and with a long curved projection on its caudomesal margin, sternum IX narrow, moderately long, setae absent.

PUPA, LARVA and EGG. Not known.

DISCUSSION. The adults of *Indusius* are distinguished from the other subgenera of *Aedes* by the following combination of characters: (1) eyes widely separated and interocular space with broad scales and 3-5 pairs of setae; (2) vertex of head with only broad decumbent scales; (3) antennal pedicel of female with only a few small scales and short hairs mesally; (4) anterior and posterior dorsocentral setae present; (5) a few anterior acrostichal setae present, posterior setae absent; (6) prosternum and paratergite bare; (7) propleuron with 6-10 setae; and (8) wing without remigial setae and alula with several very long thin scales on margin.

The very long thin scales of the alula are similar to those of *Aedes* (*Nothoskusea*) *chathamicus* Dumbleton, *Aedes* (*Halaedes*) *australis* (Erichson), *Opifex fuscus* Hutton and species of *Culiseta* Felt. The feature of widely separated eyes is similar to Section B of *Aedes* (*Verrallina*) Theobald (see Reinert 1974b).

A number of features of the male differ markedly from the other subgenera of *Aedes* as follows: antenna only slightly plumose and very long; development of the maxillary palpus; shape of the proboscis; leg I with femur short and somewhat thickened, tarsus short with tarsomeres 2-4 very short, posttarsus with a pair of very large simple unguis and an enlarged empodium; and scutum with only sparsely scattered narrow curved scales. The enlarged empodium of the tarsi is similar to that of *Deinocerites* Theobald while the shortened femur and tarsus and enlarged unguis resemble those of *Opifex fuscus*.

The male genitalia display characters of the subgenus that are unusual and are as follows: gonocoxite broad, somewhat conical, with numerous short and several long setae and a dense pile of long hair-like spicules; gonostylus short, expanded, covered with numerous moderately long spicules and apical portion with file-like ridges; proctiger with paraproct consisting of a narrow caudally projecting sclerotized strip along lateral margin of cerci, an anterior projection and a broader basal area; shape of tergum IX; and parameral apodeme with a long curved projection attached to caudal mesal margin. The gonocoxite is developed somewhat like that of *Opifex* Hutton while the file-like ridges of the gonostylus is similar to that of some *Paraedes* Edwards. The long curved structure of the parameral apodeme is attached at the same point as the opisthophallus of *Verrallina*, however, it curves ventrally and caudally and does not form a bridge to the other parameral apodeme.

Indusius possesses several interesting morphological features which are similar to those of the more primitive members of the tribe Aedini, however, due to the absence of specimens of immature stages, lack of any biological information of the immatures and very poor taxonomic condition of the present adult specimens, its phylogenetic relationships and exact taxonomic status remain in doubt.

AEDES (INDUSIUS) PULVERULENTUS EDWARDS (Figs. 1-4)

Aedes pulverulentus Edwards 1922a: 273 (♀).

Aedes (subgenus uncertain) *pulverulentus* of Edwards 1922b: 468.

Aedes (?*Ochlerotatus*) *pulverulentus* of Barraud 1928b: 374 (♀).

Aedes (*Indusius*) *pulverulentus* of Barraud 1934: 268 (♀, ♂); Edwards in Barraud 1934: 445 (♂*).

Aedes (*Indusius*) *pulverulentus* of Horsfall 1955: 410; Stone et al. 1959: 199; Aslamkhan 1971: 153; Aslamkhan 1972: 101; Stone and Delfinado 1973: 300.

FEMALE (Fig. 1). *Head*. Antenna dark brown, 1.03-1.12 length of proboscis, pedicel golden-brown with a few small broad white scales and a few short fine golden hairs mesally, 13 flagellomeres, flagellomere 1 mostly golden-brown and with several small broad white scales near middle, flagellar whorls with 6 dark brown setae; clypeus dark brown, bare; maxillary palpus dark brown scaled with a few white scales intermixed, 4-segmented, 0.19-0.25 length of proboscis; proboscis dark brown scaled with a few white scales intermixed, 1.19-1.27 length of femur I; eyes widely separated; interocular

space covered with broad white scales, 4-5 pairs of long white interocular setae; several long brown ocular setae; scales on head all broad and decumbent except for a small patch of short erect forked white scales on occiput, vertex covered with white scales, lateral surface covered with dark brown scales and with a stripe of white ones extending from area in front of antepnotum to ocular line, postgena white scaled or mostly white scaled with small patches of dark brown scales. *Thorax*. Scutal integument blackish-brown; scutum densely covered with narrow curved white scales except for narrow curved reddish-brown ones on following areas: a few at scutal angle, a patch on anterior portion of supra-alar area and a small patch on posterior median scutal area, some specimens with a large median area of scutum covered with dusty-white scales; prescutellar space with only median area without scales; scutellum with a large patch of broad white scales on median lobe, lateral lobe with a shaggy patch of long narrow curved white scales; white to brown setae on following areas: 4-8 median anterior promontory, 1-7 (usually 1-3) anterior acrostichals, posterior acrostichals absent, 1-6 (usually 1-3) anterior dorsocentrals, numerous posterior dorsocentrals, scutal fossal (5-10 anterior and 5-12 lateral), numerous supra-alar, 4 posterior medial scutal, 1 postalar callar and scutellar (7-11 long and 6-16 short ones on lateral lobe, 6-10 long and 4-6 short ones on median lobe); pleural integument blackish-brown; antepnota widely separated, medium size, covered with narrow curved scales, upper ones reddish-brown and lower ones white, 16-23 setae, upper ones brown and lower ones white; postpronotum with narrow curved reddish-brown scales on upper margin and most of remainder covered with narrow curved white scales, lower white ones somewhat broader, 5-11 posterior brown setae; propleuron with a large patch of broad white scales, 6-10 pale brown setae; prosternum, paratergite, mesomeron, metameron and mesopostnotum bare; subspiracular area with a long patch of broad white scales; postspiracular area with a patch of broad white scales, 3-8 pale brown setae; mesepisternum with a large upper and a small lower patch of broad white scales, 2-6 upper and 8-14 posterior brown setae; prealar knob with several broad white scales, 13-21 pale brown setae; mesepimeron with a large patch of broad white scales near center, 8-19 golden-white setae dorsad of scale patch. *Legs*. Coxae I-III each with several brown setae, I covered with broad white scales and with a patch of broad brown ones on anterior area, II with a long patch of broad white scales on anterior area, III with broad white scales on anterior and dorsal areas; trochanters I-III each with broad white scales; femora I-III white scaled with a few to several brown scales intermixed (brown scales more numerous on I and II); tibia I-III white scaled with some brown scales intermixed, a number of moderately long erect brown setae, longer and stouter on III; tarsi I-III brown scaled with white scales intermixed, posteriors of I and II white scaled, III with tarsomeres 1-4 each with a narrow basal white scaled band, band occasionally indistinct on 4 and sometimes present on 5; posttarsi I-III (Fig. 3) each with 2 large ungues, I and II with ungues equal in size, each with a tooth, III with ungues equal in size, both simple. *Wing*. Dorsal and ventral veins mostly covered with broad white scales except for the following brown scaled areas: apical 0.60-0.65 of anterior surface of costa, a few intermixed on basal 0.35-0.40 of costa, base and anterior surface of remigium, a median stripe on radius, some on apical portions of radius 2, 3, 4 + 5, median 1 + 2, 3 + 4, cubitus 1 and 2; alula with a number of long narrow white scales on margin; upper calypter with a number of white setae on margin; remigial setae absent. *Halter*. Pedicel pale; capitellum white scaled. *Abdomen*. Tergum I white scaled with a few brown

scales intermixed, laterotergite covered with white scales, II-IV each brown scaled with a dorsobasal white scaled band which connects with a large irregularly shaped laterobasal white scaled patch which has a small median brown scaled area, V and VI mainly creamy-white scaled with numerous brown scales intermixed, each with an indistinct dorsobasal band and laterobasal patch of white scales; sterna white scaled, III-V each with a small ovoid lateroapical patch of brown scales; terga and sterna with a number of golden-brown setae, mostly along posterior margins. *Genitalia* (Fig. 2). Tergum VIII moderately pigmented, wide at base and tapering to a moderately broad flat apex, base nearly straight, numerous short and a few moderately long thin setae scattered over apical 0.94-0.97, basolateral seta absent, covered with minute spicules, scales absent, completely retracted into segment VII, VIII-Te index 0.64-0.79, VIII-Te/IX-Te index 1.32-1.48, length 0.18-0.23 mm, width 0.24-0.35 mm; sternum VIII moderately pigmented, moderately wide, base slightly concave, apex with a deep median indentation, numerous short and a few moderately long and long setae scattered over apical 0.98-0.99, setae on apex short and thin, setae 1-3-S close together, all basad, 1-S basomesad, 2-S laterad of 1-S, 3-S laterad and slightly distad of 2-S, covered with minute spicules, 0-4 broad scales on basomesal area (usually scales absent), apical intersegmental fold unpigmented, VIII-S index 1.02-1.10, length 0.28-0.30 mm, width 0.26-0.29 mm; tergum IX composed of 2 long narrow moderately pigmented plates which are connected mesally by a membrane, apical portion of each plate expanded and with 6-14 short thin setae, covered with minute spicules, IX-Te index 1.31-1.40, length 0.14-0.16 mm, width 0.10-0.12 mm; insula moderately pigmented, tongue-like, covered with minute spicules, 1-2 small tuberculi on apical area; lower vaginal lip moderately pigmented, narrow, covered with minute spicules, lower vaginal sclerite absent; upper vaginal lip moderately to heavily pigmented, narrow, covered with minute spicules; upper vaginal sclerite large, moderately pigmented with basomesal area produced into a narrow heavily pigmented structure; postgenital lobe moderately long, moderately wide, apex with a moderately deep median indentation (0.26-0.32 deep), 6-10 setae on each side of midline, 12-19 total setae, completely covered with minute spicules, basal median apodeme well developed and heavily pigmented, dorsal PGL index 0.85-0.95, ventral PGL index 1.65-1.67, ventral length 0.09-0.10 mm; peri-anal membrane with minute spicules; cercus moderately long, apex bluntly pointed, mesal margin nearly straight, outer margin bowed, completely covered with minute spicules, dorsal surface with short and moderately long setae on apical 0.92-0.95, 2 long setae at apex, scales absent, ventral surface with a few short and moderately long setae along mesal and outer margins, index 2.43-2.53, cercus/dorsal PGL index 3.33-4.14, length 0.19-0.21 mm; 3 heavily pigmented, spherical seminal capsules, one large and 2 medium sized ones, each with a few small seminal capsule pores near orifice, base of accessory gland duct moderately pigmented.

MALE (Fig. 3). Only 2 badly rubbed males known, one of which is mounted on a microscope slide and has the genitalia missing. *Head*. Antenna slightly plumose, dark brown, very long, 1.86-1.88 length of proboscis; 13 flagellomeres, flagellar whorls with 10-12 setae; clypeus brown, bare; maxillary palpus dark brown scaled, 4-segmented, basal 2 segments short, segment 3 long and approximately 0.5 length of apical segment which is long and swollen, 1.01-1.03 length of proboscis, with numerous short brown setae; proboscis short, brown scaled, apical half swollen and somewhat flattened, numerous long brown setae on lateral and ventral areas, labellum large, 0.86-0.91

length of femur I; scaling on head as in female; eyes widely separated; inter-ocular space with broad white scales and 3 pairs of pale setae. *Thorax*. Scutal integument mostly golden-brown; scutum with sparsely scattered reddish-brown narrow curved scales, a narrow stripe of similar scales on acrostichal area; scutellum completely denuded of scales; brown setae on following areas: 9 median anterior promontory, a few anterior acrostichals, posterior acrostichals apparently absent, numerous anterior and posterior dorsocentrals, scutal fossal (6-8 anterior, 4-6 lateral and 2-4 posterior), numerous supra-alar, 8 posterior medial scutal, 1 postalar callar and scutellar (10-11 on lateral lobe and 8-10 on median lobe); pleural integument golden-brown; antepnota widely separated, medium sized, scales absent, 11-12 brown setae; postpronotum without scales, 4 posterior brown setae and 2-3 small hairs; propleuron with a few broad white scales, 6-8 brown setae; prosternum, subspiracular area, paratergite, mesomeron, metameron and mesopostnotum bare; postspiracular area without scales, 4-6 brown setae; mesepisternum with a medium size upper and a small lower patch of broad white scales, 3-4 upper and 7 posterior brown setae; prealar knob with a few white scales, 9-11 brown setae; mesepimeron with a large patch of broad white scales near center, 7 brown setae dorsad of scale patch. *Legs*. Coxae I-III each with several golden-brown setae, I with a patch of broad white scales on anterior area, II and III each with a small patch of broad white scales; trochanters I-III each with a few broad white scales; femora I-III brown scaled, II and III each with lower anterior areas pale scaled, I-III with posteriors brown scaled with large areas of white scales; tibiae I-III each brown scaled, some pale scales on posterior areas of I and II; tarsi I-III short, each brown scaled, I with tarsomeres 2-4 very short; posttarsi I-II (Fig. 3) each with 2 ungues, empodium large, I with ungues large, simple and equal in size, II with ungues large, unequal in size, larger one with a tooth, smaller one simple, III missing on both specimens. *Wing*. Dorsal and ventral veins rubbed, only brown scales present, anterior surface and base of costa dark brown scaled; alula with a number of long narrow pale brown scales on margin; upper calypter with a number of pale brown setae on margin; remigial setae absent. *Halter*. Pedicel pale; capitellum pale brown scaled. *Abdomen*. Badly rubbed, Tergum I brown scaled, laterotergite covered with white scales, II-V each brown scaled with a laterobasal patch of white scales, no apparent dorsobasal white scaled bands or stripes, remainder of abdomen missing (except badly damaged genitalia of one specimen); sterna brown scaled with a few pale scales; terga and sterna with several short setae on lateral and posterior margins, tergum and sternum VIII (Fig. 3) with characteristic shapes. *Genitalia* (Figs. 3, 4). Tergum IX heavily pigmented, long, apex convex, covered with small hair-like spicules, 7-8 short setae on each side of midline; gonocoxite moderately long, broad, somewhat conical, dorsal surface with a few long thin setae on basal area, lateral surface with several long thin setae, ventral surface with several long thin setae on basal area and a number of short setae scattered over remainder of area, distal 0.6 covered with a pile of long hair-like spicules, apical portion of mesal membrane with several short setae and minute spicules (remainder of mesal membrane lost); gonostylus short and broad, basal area moderately broad, apical area expanded, dorsal surface with distal area covered with file-like ridges which terminate in a serrated apex, a few minute setae at base of file-like area, ventral surface with numerous moderately long spicules (many spicules stout) and a few minute setae, attached subapically to gonocoxite, gonostylar claw absent; basal mesal lobe badly damaged but a small tergobasal strip and a sternobasal strip each with several short setae remain, probably consists of a large plate with numerous short

setae located on basal area of mesal membrane of gonocoxite, connected with its mate by a heavily pigmented V-shaped structure; proctiger short, paraproct heavily pigmented, consists of a caudally projecting strip along lateral margin of cercus, an anterior arm and a broader basal area, cercus membranous without cercal setae; tergum X short, covered with small spicules, base attached to base of paraproct and apex attached to caudal area of tergum IX; phallosome missing except for a moderately long and broad parameral apodeme which has a long curved caudal projection attached to its caudomesal margin; sternum IX heavily pigmented, narrow and moderately long, small spicules on apical portion, setae absent.

PUPA, LARVA and EGG. Not known.

DISCUSSION. The female of *pulverulentus* is similar in habitus to *Aedes* (*Aedimorphus*) *gouldi* Reinert, however, it is distinguished from *gouldi* by the following: proboscis and maxillary palpus brown scaled; vertex with only broad decumbent scales; eyes widely separated; scutal scales white; and remigial setae absent. The scutum of *pulverulentus* is white scaled and resembles species in subgenera *Christophersiomysia* Barraud and *Finlaya* Theobald of *Aedes*, but is easily distinguished from them by features listed for the subgenus.

Female genitalia of *pulverulentus* are similar to those of the subgenus *Aedimorphus* but differ by the following features: shape of tergum VIII; sternum VIII with a very deep median apical indentation and placement of setae 1-3-S; and insula with only 1-2 tuberculi.

The male shows a strong sexual dimorphism and differs from the female most noticeably in the following: very long antenna, maxillary palpus, proboscis, tarsus and posttarsus I, and scutal scaling. Other differences exist between the 2 sexes in the scaling of the pleural areas, legs, wing and abdomen.

The single known male genitalia specimen, dissected and mounted on a microscope slide, was very badly damaged and consisted of 16 pieces scattered throughout the mounting medium underneath the cover glass. The specimen was in such a poor condition it was necessary to remount the fragments so that the component parts of the genitalia could be determined. A careful search of the original preparation was conducted prior to remounting the genitalia and some structures could not be found (e. g. phallosome) and are presumed to have been lost. The above description and figures 3 and 4 are a result of the reconstructed genetalic fragments and are as complete as could be determined from the poor specimen.

TYPE-DATA. The holotype female is in the British Museum (Natural History) (BMNH) and bears the following information on the labels: *Aedes pulverulentus*, Edw.; Type H. T.; India, Nowshera, N. W. P., 4. VII. 1911, Smith [collector], Capt. P. J. Barraud 1921-166; T74.67 Term. [genitalia preparation number]. The holotype is in excellent condition and the genitalia were mounted by me in Canada balsam on a microscope slide. The hand written label on the holotype gives the collection date as 4. VII. 1911 which differs from Edwards (1922a: 274) who lists the date as 4. vi. 1911. A paratype female in the BMNH contains the same label data as the holotype except it possesses the collection date of 4. VI. 1911. This paratype is in good condition. An additional female in the BMNH is dissected and mounted on a microscope slide and bears the following information on the label: *Aedes pulverulentus* ♀, Nowshera, N. W. India, per P. J. Barraud. I assume this specimen to be a paratype.

DISTRIBUTION. 27 specimens examined: 25♀, 2♂.

PAKISTAN. *Karachi Federal Territory*, Karachi; 16♀. *Northwest Frontier*,

Peshawar, Nowshera; 1♀ (holotype), 2♀ (paratypes). *Punjab*, Multan, Dera Ghazi Khan, Dera Ismail Khan; 3♀, 2♂. Larkana, Sind; 3♀.

Distribution from literature.

PAKISTAN (Aslamkhan 1971: 153); Karachi, Larkana, Sind, Mari Indus, Nowshera (Barraud 1928b: 375), Indus Valley, Dera Ismail Khan (Barraud 1934: 269).

BIONOMICS. The 3 females from Dera Ghazi Khan were collected biting cattle (14 July 1970, M. Aslamkhan). Barraud (1928b: 375) reports specimens resting under an ice chest at Larkana, Sind.

SUBGENUS *EDWARDSAEDES* BELKIN

Type species: *Culex imprimens* Walker

Culex in part of Walker 1860: 144.

Culicada in part of Theobald 1910a: 21.

Ochlerotatus in part of Edwards 1913: 228.

Aedes (*Ecculex*) in part of Edwards 1922b: 467.

Aedes (*Banksinella*) in part of Edwards 1924: 371; Knight and Hull 1953: 465.

Aedes (*Ochlerotatus*) in part of Edwards 1924: 377.

Aedes (*Aedimorphus*) in part of Edwards 1929: 5.

Aedes (*Neomelaniconion*) in part of Stone et al. 1959: 200.

Aedes (*Edwardsaedes*) Belkin 1962: 408; Huang 1968: 187.

FEMALE. *Head*. Antenna long, pedicel with a few scattered small broad scales and short fine hairs mesally; maxillary palpus 5-segmented, segment 5 minute; proboscis noticeably longer than femur I; vertex covered with narrow curved decumbent scales and numerous erect forked scales; occiput with numerous erect forked scales. *Thorax*. Scutum covered with narrow curved scales, similar scales on scutellum; acrostichal and dorsocentral setae numerous; antepnotum with narrow curved scales, numerous setae; postpronotum covered with narrow curved scales, 6-14 posterior setae; propleuron with broad scales, 27-42 setae; subspiracular area with a patch of broad white scales and several to numerous short pale hairs intermixed; postspiracular area with scales, 8-18 setae; prealar knob with 17-40 setae; mesepimeron with a large median patch of broad scales, 16-29 setae dorsad of scale patch, lower setae absent. *Legs*. Posttarsi I-III with ungues equal in size and each with a tooth. *Wing*. Alula with numerous narrow scales on margin; remigial setae present. *Genitalia*. Tergum VIII and sternum VIII each with setae on most of surface, scales usually absent but a very few occasionally present; sternum VIII large, base and apex each with a deep median indentation, a small lobe on each side of apical indentation; tergum IX long, apex with a moderately deep median indentation and with several setae on each side of midline; insula long, tongue-like, without setae or tuberculi; lower and upper vaginal lips narrow; lower vaginal sclerite absent; upper vaginal sclerite large, heavily pigmented and with a fragmented appearance; postgenital lobe short, broad, a number of setae on each side of midline; cercus long, narrow, apex sharply rounded, scales absent; 3 seminal capsules, one large and 2 slightly smaller ones, heavily pigmented, spherical.

MALE. Essentially as in the female. *Head*. Antenna with numerous long dorsal-ventrally directed setae in each flagellar whorl; maxillary palpus longer than proboscis, 5-segmented, segments 1 and 2 short, segments 3-5 long,

segment 5 and apical portion of segment 4 with numerous long erect lateral and ventral setae, segment 5 upturned. *Legs*. Posttarsi I-III with 2 ungues each bearing a tooth, I and II with ungues unequal in size. *Abdomen*. Terga I-VII with numerous long curved setae along lateral margins, VIII with a number of short stout heavily pigmented setae in a row along apical margin. *Genitalia*. Tergum IX with 2 narrow lateral plates each with a caudomesal lobe bearing several setae, median area between plates membranous; gonocoxite short, broad, with setae and broad scales, mesal surface membranous, gonostylus attached at apex; gonostylus moderately long and with setae, gonostylar claw absent; basal mesal lobe consists of a broad raised plate with numerous setae, situated on basal area of membranous mesal surface of gonocoxite; paraproct with a broad basal area and a very heavily pigmented claw-like tergally curved apical area, cercus membranous except for a pair of small pigmented rectangular plates on dorsal surface, cercal setae absent; phallosome with aedeagus long, narrow, heavily pigmented, apex sagittate, base divided into 2 slender plates each with a few dorsobasal teeth, paramere moderately long, attached subbasally to parameral apodeme, parameral apodeme very long, attached near middle to apodeme of gonocoxite; sternum IX broad, lateral, basal and median areas pigmented, several setae on median caudal area.

PUPA. *Respiratory trumpet*. Short, heavily pigmented. *Metanotal plate*. Seta 10-CT caudad and laterad of 11-CT. *Abdomen*. Setae 2, 3-I widely separated; 9-VII stout, multiple branched, directly cephalad of 6-VII; 9-VIII well developed, multiple branched. *Paddle*. Outer margin with minute serrations on basal area and minute spicules on apical area; 1-P short.

LARVA. *Head*. Seta 4-C small, multiple branched, mesad and far cephalad of 5, 6-C; 5-7-C long, barbed, multiple branched; 6-C laterad and slightly cephalad of 5-C; 7-C laterad and cephalad of 6-C; 12, 13-C approximated and removed from cephalic border of head; dorsomentum with numerous teeth; ventromedian cervical sclerite well developed (see Fig. 10). *Antenna*. Long, slender, with numerous well developed spicules; 1-A long, multiple branched; 2-A with a subapical constriction. *Thorax*. Setae 9-12-M, T located on large heavily pigmented plates bearing a long stout heavily pigmented apical spine. *Abdomen*. Seta 1-VII short, multiple branched; 13-VII not widely separated from 10-VII; saddle completely rings segment X, acus absent; 3-X multiple branched, only slightly longer than 2-X; ventral brush with numerous long multiple branched setae, precatal ones inserted in ventral margin of saddle. *Siphon*. Moderately long, acus present; pecten with numerous teeth, a few apical teeth wider spaced than remainder; seta 1-S small, multiple branched, base attached distad of last pecten tooth.

EGG. See description for *imprimens*.

DISCUSSION. The subgenus *Edwardsaedes* is separated from the other subgenera of *Aedes* by the following features: in the adults by the combination of (1) head with vertex covered with narrow curved decumbent and numerous erect forked scales, (2) antennal pedicel with a few scattered small broad scales and short fine hairs mesally, (3) numerous anterior and posterior dorsocentral and acrostichal setae, (4) propleuron with numerous (24-42) setae, (5) prosternum bare, (6) subspiracular area with a patch of broad scales and short fine hairs intermixed, (7) mesepimeron with 11-29 setae dorsad of scale patch and without lower setae, (8) posttarsi I-III each with both ungues toothed, (9) female maxillary palpus 5-segmented, apical segment minute, and (10) male maxillary palpus long, apical segment upturned, numerous long erect setae on lateral and ventral surfaces of segment 5 and apical portion of seg-

ment 4; in the female genitalia by the combination of (1) tergum VIII with setae on most of its surface, scales usually absent, (2) sternum VIII shape, scales absent, (3) insula long, tongue-like, setae and tuberculi absent, (4) cercus long, narrow, scales absent, (5) upper vaginal sclerite large, heavily pigmented, with a fragmented appearance, and (6) one large and 2 smaller seminal capsules; in the male genitalia by the combination of (1) tergum IX membranous mesally, each lateral plate with a caudomesal lobe bearing several short setae, (2) gonocoxite short and broad, gonostylus attached at apex, (3) gonostylus without a gonostylar claw, (4) basal mesal lobe a broad raised plate bearing numerous setae, (5) proctiger with paraproct formed into a heavily pigmented, strongly curved, claw-like structure, cercal setae absent, and (6) phallosome with aedeagus long, narrow, apex sagittate, basal area with teeth, parameral apodeme very long; in the pupa by the combination of (1) setae 1-3-CT approximately equally developed, (2) seta 10-CT caudad and laterad of 11-CT, (3) setae 2, 3-I widely separated, and (4) setae 9-VII, VIII well developed, multiple branched and with branches thickened and barbed; and in the larva by the combination of (1) position and development of head setae 4-7-C, (2) antenna long, spiculate, seta 1-A well developed and multiple branched, (3) thoracic setae 9-12-M, T situated on large heavily pigmented plates bearing a long heavily pigmented apical spine, and (4) segment X with saddle completely ringed segment, ventral brush with several setae inserted in ventral margin of saddle and seta 3-X multiple branched and only slightly longer than 2-X.

Adults of *Edwardsaedes* are similar in habitus to those of *Aedimorphus*, *Ochlerotatus* and *Indusius* but can be distinguished from these subgenera by the features listed above. The male maxillary palpus resembles those of members of the subgenus *Neomelaniconion*, however, the male genitalia and other adult features (see above) differ between these 2 subgenera. The characteristic shape of the apical portion of sternum VIII allows easy recognition of female *Edwardsaedes*, even in undissected specimens.

Pupae of *Edwardsaedes* resemble those of the following subgenera of *Aedes*: *Neomelaniconion*, *Aedimorphus*, *Verrallina* and *Aedes* Meigen. However, they can be recognized by one or more of the characters listed above. The pupae of this subgenus also possess setae 6-III-VII multiple branched which separates them from a number of *Aedes* subgenera.

Larvae of *Edwardsaedes* are similar to those of subgenera *Aedimorphus*, *Neomelaniconion*, *Verrallina* and *Aedes*. They can be distinguished from these subgenera, as well as all subgenera of *Aedes*, by the above combination of features. Reinert (1973, 1974b) gives descriptions and illustrations of the larvae and pupae of *Aedimorphus* and *Verrallina*. The subapical constriction of antennal seta 2-A and the presence of precratal setae of the ventral brush are shared by members of a number of *Aedes* subgenera whose larvae inhabit temporary ground pools (Reinert 1974b). Presence of numerous multiple branched setae of the ventral brush of segment X, antenna with well developed spicules and antennal seta 1-A well developed also appear to be shared by larvae of the genus *Aedes* collected from temporary fresh water ground pools as compared to species collected from plant container water. The saddle which rings segment X and with setae of the ventral brush attached along its ventral margin is similar to those of the genus *Psorophora* Robineau-Desvoidy. Development of the ventromedian cervical sclerite is similar to those of *Aedes* (*Neomelaniconion*) *lineatopennis* (Ludlow) and species of *Aedimorphus* and *Verrallina*.

DISTRIBUTION. *Aedes imprimens*, the only included species of *Edwardsaedes*, exhibits a wide geographical range (Fig. 5). The species is found

throughout Southeast Asia, New Guinea, northern tip of Australia, and east into the Solomon Islands, the northern range extends throughout Japan and into South Korea, and the western limit is Bengal, India.

MEDICAL IMPORTANCE. Females of *imprimens* are aggressive man-biters, readily bite through clothing and in some areas are troublesome pests. Very few attempts have been made to isolate pathogens from this species even though it readily feeds on man. Yamada (1927) in an experimental laboratory study found *imprimens* from Japan not to be a suitable intermediate host for *Wuchereria bancrofti* (Cobbold).

BIONOMICS. Immatures usually inhabit temporary unmoving fresh water in flood pools located in shaded areas in forests. Eggs are laid singly and require drying for 4-6 weeks prior to hatching. The larvae complete their development within 3 days. Females are vicious daytime biters and readily attack in shaded areas, even feeding through heavy clothing. Adults have been collected resting in houses, stables, vegetation and in light traps. Specimens have been taken at elevations from sea level to 1,200 m.

Aedes (EDWARDS) *Aedes* IMPRIMENS (WALKER)
(Figs. 5-11)

Culex imprimens Walker 1860: 144 (♀); of Theobald 1901: 422 (♀); Blanchard 1905: 306 (♀); Brunetti 1907: 348; Brunetti 1912: 470; Theobald 1910b: 350.

Culex imprimiens of Giles 1900: 262 (♀, *lapsus calami*); Giles 1902: 411 (♀, *lapsus calami*); Theobald 1905: 26 (*lapsus calami*).

Culex Auratus Leicester 1908: 153 (♀); of Knight and Hull 1953: 466.

Culicada suknaensis Theobald 1910a: 21 (♀); of Theobald 1910b: 297 (♀*); Edwards 1922b: 467 (synonymy); Barraud 1928a: 663 (questioned synonymy with *imprimens*); Barraud 1934: 257 (transferred *suknaensis* from *imprimens* to *caecus*).

L. auratus of Brunetti 1912: 467 (*lapsus calami*).

Culex auratus of Edwards 1913: 228 (questionable synonymy with *imprimens*; name preoccupied by *Aedes auratus* Graham 1906); Edwards 1932: 170; Stone et al. 1959: 201; Mattingly 1961: 53; Belkin 1962: 409; Stone and Delfinado 1973: 293.

Ochlerotatus imprimens of Edwards 1913: 228; Brunetti 1920: 136; Senior-White 1923: 78.

Aedes (*Ecculex*) *imprimens* of Edwards 1922b: 467; Brug and Haga 1923: 639.

Aedes (*Banksinella*) *brugi* Edwards 1924: 371 (♂); of Edwards in Paine and Edwards 1929: 314 (suspected synonymy with *imprimens*); Knight and Hull 1953: 468 (suggested synonymy with *imprimens*); Stone et al. 1959: 200 (questionable synonymy with *imprimens*); Belkin 1962: 409 (synonymy).

Aedes (*Ochlerotatus*) *imprimens* of Edwards 1924: 377 (♀); Edwards 1925: 257.

Aedes (*Aedimorphus*) *imprimens* of Edwards 1929: 5; Paine in Paine and Edwards 1929: 306; Brug and Edwards 1931: 258; Edwards 1932: 170; Taylor 1934: 20; Bonne-Wepster and Brug 1937: 38 (♀*); Bohart 1945: 63 (L); Brug and Bonne-Wepster 1947: 185; Bonne-Wepster 1954: 239 (♀); Assem and Bonne-Wepster 1964: 98 (♀, L*).

Aedes (*Aedimorphus*) *caecus* (Theobald) of Edwards 1932: 170 (in part); Barraud 1934: 257 (in part); Reinert 1973: 28 (transferred *suknaensis* from *caecus* to subgenus *Edwardsaedes*).

- Aedes* (*Banksinella*) *brugi* of Edwards 1932: 170; Taylor 1934: 20; Iyengar 1955: 30.
- Aedes imprimens* of Edwards in Paine and Edwards 1929: 314; Knight et al. 1944: 35 (key); Stojanovich and Scott 1965: 9, 27 (♀*, L*, key); Stojanovich and Scott 1966: 45, 117 (♀*, L*, key).
- Aedes brugi* of Knight et al. 1944: 35 (key).
- Aedes* (*Banksinella*) *imprimens* of Hsiao and Bohart 1946: 22; La Casse and Yamaguti 1950: 102 (♀*, ♂); Waku 1950: 69 (♀*, ♂*, P*); Knight and Hull 1953: 465 (♀, ♂*, L*); Horsfall 1955: 527; Iyengar 1955: 30; Hara 1957a: 65 (♀*), 1957b: 16 (♀*); Macdonald 1957: 21.
- Aedes* (*Neomelaniconion*) *brugi* of Stone et al. 1959: 200; Iyengar 1960: 68.
- Aedes* (*Neomelaniconion*) *imprimens* of Stone et al. 1959: 201; Iyengar 1960: 68; Mattingly 1961: 53 (♀*, ♂*, P*, L*); Delfinado et al. 1962: 440; Stone et al. 1966: 50, 57 (key).
- Aedes* (*Edwardsaedes*) *imprimens* of Belkin 1962: 409 (♀, ♂*, P*, L*); Stone 1963: 130; Kurihara 1963: 196 (A*); Huang 1968: 187 (A*, L*, key); Stone and Delfinado 1973: 293; Moriya et al. 1973: 54 (E*).
- Aedes* (*Neomelaniconion*) *impremens* of Basio 1971: 24 (♂*, *lapsus calami*).

FEMALE (Fig. 6). *Head*. Antenna dark brown, 0.91-1.00 length of proboscis, pedicel golden colored with mesal area dark brown and with several scattered small broad golden and brown scales and short fine brown hairs mesally, flagellomere 1 with basal 0.50-0.65 pale and with several golden and few small broad brown scales, flagellar whorls with 6 dark setae; clypeus brown, bare; maxillary palpus dark brown scaled, 5-segmented, approximate length of each segment in parentheses, 1 (0.15), 2 (0.07), 3 (0.28), 4 (0.47) and 5 (0.03), total length 0.20-0.23 length of proboscis; proboscis dark brown scaled, usually with a few pale scales intermixed on ventral and occasionally on dorsal surfaces, 1.21-1.30 length of femur I; eyes narrowly separated; interocular setae absent; ocular setae long, brown and numerous; vertex covered with narrow curved golden and white intermixed decumbent scales, a few narrow curved reddish-brown scales on anterior portion of coronal suture, numerous long erect forked golden scales; ocular line with small narrow curved white or golden-white scales, similar scales on interocular space; lateral surface with broad decumbent white scales except for a small patch of dark brown similar scales on dorsoanterior area and a few brown ones on the postgena; occiput with narrow curved decumbent white scales and numerous long erect forked scales, median ones golden and several lateral ones brown. *Thorax*. Scutal integument brown; scutum covered with narrow curved bronzy scales except for narrow curved white scales on the following: median anterior promontory area, anterior scutal fossal area and extending onto lateral area, basal portion of scutal ridge, supra-alar area, posterior median scutal area, and along margins of prescutellar space, patch of narrow curved reddish-black scales on median scutal fossal area, anterior portion of supra-alar area and occasionally among acrostichal and dorsocentral setae; scutellum with narrow curved white scales, some with a brown hue, on each lobe; scutal setae brown, numerous, on following areas: 6-10 median anterior promontory, numerous acrostichal (anterior and posterior), numerous dorsocentral (anterior and posterior), scutal fossal (6-10 anterior, 3-9 lateral and 2-5 posterior), numerous supra-alar, 6-8 posterior medial scutal, 1 postalar callar and scutellar (9-16 long and 4-7 short ones on lateral lobe, 7-16 long and 4-9 short ones on median lobe); pleural integument pale brown with postpronotum, sub- and postspiracular areas and prealar

knob darker brown; anteppronota widely separated, covered with narrow curved white scales, 25-45 brown setae; postpronotum nearly covered with narrow curved scales, bronzy ones dorsally and white ones on remainder of area, some specimens with a few broad white scales ventrally, 6-14 brown posterior setae, several short pale hairs ventrad of setae; propleuron with a patch of broad white scales, 27-42 golden to brown setae; prosternum, mesomeron and metameron bare; subspiracular area with a patch of broad white scales, several to numerous short pale hairs intermixed with scales; postspiracular area with a patch of broad white scales, 8-18 golden to brown setae; paratergite moderately broad, usually bare, however, a few specimens representing the entire range, possess a few narrow white scales; mesepisternum with a large upper and a medium size lower patch of broad white scales, 4-8 upper and 12-24 posterior golden-brown setae, lower ones shorter and golden; prealar knob with 17-40 golden-brown setae; mesepimeron with a large patch of broad white scales on middle, 16-29 golden setae dorsad of scale patch, lower setae absent (1 specimen from Thailand, 00168-111, had a single seta ventrad of scale patch on the left side, this seta was poorly developed, kinky and considered to be an anomaly).

Legs. Coxae I-III each with several golden-brown setae, I with broad brown scales, a dorsal and a ventral patch of broad white scales, II with an antero-lateral patch of broad white scales, some specimens with a few broad brown scales ventrally, III with a small anteroventral and a small posteroventral patch of broad white scales; trochanters I-III with broad white scales and short pale setae; femora I and II each with anterior surface dark brown scaled with a narrow basal band of white scales, posterior surface dark brown scaled with a longitudinal white scaled stripe, on median 0.70-0.85 of I and on ventral 0.7-0.8 of II, stripes broad basally and narrow apically, III white scaled with a narrow longitudinal dark brown scaled stripe which forms a broad band on apical 0.25-0.35, a few dorsobasal white scales, I-III each with a few apicolateral white scales on posterior surface; tibiae I-III each dark brown scaled with a narrow basal band of white scales, band very narrow on I, posterior surface of I and II dark brown scaled with a longitudinal pale scaled stripe from base to apex, ventral on I and dorsal on II; tarsi I-III dark brown scaled, I with white scaled narrow basal bands on tarsomeres 1-3, some specimens with only a dorsobasal white scaled spot on 3, II with white scaled narrow basal bands on tarsomeres 1-4, some specimens with only a dorsobasal white scaled spot on 4, III with white scaled narrow basal bands on tarsomeres 1-5; posttarsi I-III (Fig. 11) each with 2 ungues, equal in size, each with a tooth. *Wing.* Dorsal and ventral veins with dark brown scales except for a small white scaled patch at base of costa; alula with numerous long narrow brown scales on margin; upper calypter with a number of long brown setae on margin; 1-3 brown remigial setae. *Halter.* Pedicel pale; capitellum with dorsal surface white scaled apically and brown scaled basally, ventral surface white scaled. *Abdomen.* Terga dark brown scaled, I with a large white scaled patch on laterotergite, II-VII each with a large laterobasal white scaled patch, II-IV also with a dorso-basal narrow white scaled band which connects with, or nearly with, laterobasal white scaled patches, V-VII usually with several dorsobasal white scales, some specimens with white scales forming a narrow band on V, VI and VII with a few to numerous golden-brown scales scattered over terga, a few specimens with much of dorsal surface covered with pale scales; sterna yellowish-white scaled, II-VI each with a narrow apical band of dark brown scales, VII of some specimens with a few dark brown scales apically; terga and sterna with numerous short and moderately long golden setae, mostly along posterior margins. *Genitalia* (Fig. 7). Tergum VIII lightly pigmented, base strongly concave

mesally, apex slightly concave or flat, lateral margins nearly straight, a number of short and moderately long thin setae scattered over entire surface, occasionally a few short setae on membranous area near lateral and basal margins, basolateral seta absent, covered with minute spicules, 0-7 (usually 0-3) small moderately broad scales, basal 0.75-1.00 retracted into segment VII, VIII-Te index 0.93-1.04, VIII-Te/IX-Te index 1.86-2.07, length 0.33-0.35 mm, width 0.32-0.44 mm; sternum VIII lightly pigmented with apical 0.35 moderately pigmented, large, long, base with a deep median indentation, apex with a deep narrow median indentation and with a small lobe on each side of indentation, a number of short and a few long setae scattered over entire surface, setae 1-3-S widely separated, located in a more or less diagonal line, 1-S basomesad, 2-S approximately 0.48 from 1-S, 3-S approximately 0.52 from 2-S, covered with minute spicules, 0-2 (usually absent) broad scales, apical intersegmental fold unpigmented, VIII-S index 1.01-1.14, length 0.39-0.44 mm, width 0.37-0.40 mm; tergum IX moderately pigmented with midline slightly less pigmented, long, widest point near apical 0.28, apex with a moderately deep median indentation and with 6-14 moderately long setae on each side of midline, 15-26 total setae, covered with minute spicules, IX-Te index 0.91-1.13, length 0.16-0.23 mm, width 0.14-0.21 mm; insula lightly pigmented, long, tongue-like, without setae or tuberculi, covered with short hair-like spicules; lower vaginal lip lightly pigmented, narrow, covered with short hair-like spicules, lower vaginal sclerite absent; upper vaginal lip moderately to heavily pigmented, narrow, covered with short hair-like spicules, upper vaginal sclerite large, heavily pigmented with unequal pigmentation toward inner caudal margin giving it a fragmented appearance; postgenital lobe short, broad, apex with a shallow to small (0.05-0.12 deep) median indentation, 7-14 setae on each side of midline, 15-26 total setae, covered with short hair-like spicules, dorsal PGL index 0.72-0.94, ventral PGL index 1.51-1.95, ventral length 0.13-0.17 mm; peri-anal membrane with short spicules scattered over entire surface; cercus long, narrow, apex sharply rounded, 2 long setae at apex, completely covered with minute spicules, dorsal surface with numerous short and moderately long setae on apical 0.84-0.90, scales absent, ventral surface with a few short setae along outer, apical and inner margins, cercus index 3.57-4.33, cercus/dorsal PGL index 4.17-5.81, cercus length 0.34-0.37 mm; 3 seminal capsules, one large and 2 slightly smaller ones, heavily pigmented, spherical, each with a short pigmented neck, several small seminal capsule pores near orifice, base of accessory gland duct heavily pigmented.

MALE (Fig. 6). Essentially as in the female but with the following differences. *Head*. Antenna 0.87-0.96 length of proboscis, numerous long brown setae in each flagellar whorl, setae directed mainly dorsoventrally; maxillary palpus 1.25-1.34 length of proboscis, brown scaled, 5-segmented, segments 1 and 2, 3 and 4 ankylosed, segment 5 and apical 0.6 of segment 4 with numerous long brown erect setae on lateral and ventral surfaces, segment 5 upturned, approximate length of each segment in parenthesis, 1 (0.04), 2 (0.02), 3 (0.22), 4 (0.38) and 5 (0.34); proboscis 1.17-1.30 length of femur I; vertex and lateral surface of head with dark decumbent scales absent. *Thorax*. Anteprenotum with several broad white scales in addition to a few narrow curved white ones; postpronotum with a few narrow curved golden-white scales and a very few broad white ones ventrally, 5-9 brown posterior setae; propleuron and postspiracular area without scales (occasionally a specimen with one or 2 broad white scales); prealar knob with 13-19 golden-brown setae; mesepimeron with 11-19 golden setae dorsad of scale patch. *Legs*. Tarsi I and II with pale scaling reduced;

posttarsi I-III (Fig. 11) with 2 unguis each bearing a tooth, I and II with unguis unequal in size, III with unguis equal in size. *Wing*. Pale scaled spot at base of costa very small; 1 remigial seta. *Abdomen*. Terga brown scaled, II-VII each with a narrow dorsobasal white scaled band, band somewhat broader mesally, laterotergite of I with a large white scaled patch; I-VII with numerous long curved golden-brown setae along lateral margins, VIII (Fig. 11) with a broad basal band of pale scales and a number of short stout heavily pigmented setae in a row along apical margin; sterna II-VII golden scaled with a few brown scales on apical margins, numerous long golden-brown setae, VIII golden-white scaled with a narrow apical band of brown scales. *Genitalia* (Fig. 8). Tergum IX consists of 2 narrow lateral heavily pigmented plates, mesal area membranous, each lateral plate with a small narrow lobe on caudomesal margin bearing 5-9 (usually 7-8) short setae, covered with minute spicules; gonocoxite short, broad, heavily pigmented, covered with minute spicules, dorsal surface with several long and a few short setae along outer area, lateral surface with a number of long setae and several broad scales, ventral surface with several long setae on apical area, several moderately long and short setae scattered over basal 0.65 and a few broad scales on outer area, mesal surface membranous; gonostylus moderately long, approximately 0.68 length of gonocoxite, heavily pigmented, bifurcated, outer arm long, narrow and curved, inner arm short, broader and with 4-8 (usually 4-5) short setae, gonostylar claw absent; basal mesal lobe consists of a broad apically raised plate situated on basal area of mesal surface of gonocoxite, narrowly attached to basomesal area of dorsal surface and broadly attached to basomesal area of ventral surface of gonocoxite, dorsal surface of plate covered with 38-54 moderately long curved setae, those along inner and apical margins somewhat stouter, apical setae also on short tuberculi, ventral surface covered with short spicules, basal area connected with its mate by a narrow moderately pigmented band which is covered with small spicules; proctiger moderately long, paraproct consists of broad heavily pigmented basal area and a narrow very heavily pigmented claw-like apical area which is strongly curved tergally, cercus membranous with a pair of small moderately pigmented rectangular plates on the dorsal surface, each plate attached to distal portion of broad basal area of paraproct, cercal setae absent; tergum X narrow, heavily pigmented, curved, base attached to base of paraproct and apex attached to caudoventral margin of tergum IX at base of lobe; phallosome with aedeagus long, narrow, heavily pigmented, apex sagittate, base narrowly divided into 2 thin plates each with a few dorsobasal teeth, paramere moderately long, 0.74-0.82 length of aedeagus, heavily pigmented, apex attached to base of aedeagus and attached near base to parameral apodeme, parameral apodeme very long, moderately broad, heavily pigmented, attached near middle to apodeme of gonocoxite; sternum IX medium size, lateral, basal and median areas heavily pigmented, 4-7 short to moderately long setae on median caudal area.

PUPA (Fig. 9). Chaetotaxy as figured and recorded (Table 1). Moderately pigmented, some specimens with heavily pigmented areas of cephalothorax, metanotal plate and abdominal segments I-V; ocular plate without cuticular facets. *Respiratory trumpet*. Heavily pigmented, index 2.72-3.41, mean 3.09. *Cephalothorax*. Setae 1-3-CT approximately equally developed. *Metanotal plate*. Seta 10-CT caudad and laterad of 11-CT. *Abdomen*. Setae 2, 3-I widely separated; 9-VII stout, barbed, triple to 5 branched, positioned directly cephalad of 6-VII; 9-VIII well developed, barbed, 6-10 branched. *Paddle*. Ovoid; minute serrations on distal portion of basal 0.51-0.62 of outer margin;

minute spicules on apical 0.38-0.49 of outer and apical 0.04-0.10 of inner margins; midrib does not reach apex; seta 1-P short, single or double; index 1.47-1.56, mean 1.52.

LARVA (Fig. 10). Chaetotaxy as figured and recorded (Table 2). *Head*. Covered with granules dorsally and ventrally; seta 4-C small, 6-10 branched; 5-C long, triple to 6 branched; 6-C long, double to 5 branched; 7-C long, 6-14 branched; 12-C small, triple to 6 branched; 13-C moderately long, double or triple; dorsomentum with 41-43 (usually 41) teeth, heavily pigmented; ventro-median cervical sclerite heavily pigmented. *Antenna*. Long, slender, moderately pigmented, numerous well developed spicules; seta 1-A long, barbed, 5-12 branched, base inserted 0.36-0.43 from base of antenna; 2-A long, with a subapical constriction; 3-A short, 0.28-0.40 length of 2-A; 4-A moderately long, 0.43-0.55 length of 2-A; 5-A flat, apical portion membranous, basal portion pigmented with a short dorsal spine; 6-A short, 0.28-0.33 length of 2-A. *Abdomen*. Setae 6-I-VI and 7-I-II located on small heavily pigmented plates; 8-IV-VII multiple branched; 1-VII short, 5-10 branched; 1, 2-VII on common small pigmented plate; comb consists of 8-15 (usually 12) scales arranged in 2 irregular rows, each scale with a long stout median apical spine and short lateral denticles on laterobasal areas; saddle heavily pigmented, completely rings segment X, several stout spicules on caudal area, acus absent; 4 long tapered anal papillae; 1-X short, single; 2-X short, 7-8 branched; 3-X slightly longer than 2-X, double to 5 branched; ventral brush consists of 16-17 setae, 9-10 long multiple branched (5-10 branches) setae on grid, 5-7 shorter multiple branched (4-9 branches) precratal setae which are inserted in ventral margin of saddle. *Siphon*. Moderately long, moderately pigmented, acus well developed, index 3.14-4.13, mean 3.58; pecten on basal 0.58-0.63 of siphon, composed of 14-22 (usually 18) teeth, apical 2-4 teeth wider spaced than remainder of teeth and usually smooth and curved, each tooth long, slender, pointed and with a long stout ventral denticle, several teeth also usually with an additional minute denticle; seta 1-S short, double to 7 (usually 3-4) branched, base attached on basal 0.64-0.71 of siphon distad of last pecten tooth.

EGG (Fig. 11). The following account of the egg is taken from Moriya et al. (1973). The egg chorion has a surface sculpturing consisting of a net-like pattern of cells when viewed under lower magnification. Under higher magnification each cell of the pattern had a length of about 20 microns and a width of about 10 microns. The inner part of each cell possessed a hill-like process with an uneven surface consisting of small depressions and elevations. The hill-like process was surrounded by cloud-like structures. Eggs of *imprimens* are broadly fusiform in shape, black, with a length of 0.6-0.8 mm (mean 0.65 mm) and a breadth of 0.18-0.25 mm (mean 0.22 mm). Maximum width of egg is just before middle. The authors give dorsal and lateral outlines (page 49) and a scanning electron microphotograph of the surface sculpturing of the egg (page 51).

DISCUSSION. Females of *imprimens* are similar in habitus to *Aedes vexans* Meigen and *Aedes caecus* (Theobald), both in subgenus *Aedimorphus*, as demonstrated by a number of specimens found in the U. S. National Museum (Natural History) (USNM) and the BMNH collections labeled as *vexans* and *caecus* but were actually *imprimens* and vice versa. *Aedes imprimens* females can be distinguished from these species by the development of the maxillary palpus, presence of hairs mixed with scales on subspiracular area, and type and color of other pleural scales. Males of *imprimens* are easily recognized by the development of the maxillary palpus; however, they resemble

those of *Aedes lineatopennis*. The scutal scaling of the latter species differs markedly from *imprimens*. Specimens from Java (Gombong, Padaherang and Tilatjap) previously reported in the literature as *imprimens* are *vexans vexans*. A female in the BMNH identified as *imprimens* by Barraud (1928a: 664) from Rangamati, Chittagong Hill Tracts, is *Aedes caecus*.

Leicester's (1908: 153) description of *auratus* fits *imprimens* very well and I think there is little doubt the 2 are conspecific. I also concur with the synonymy of *brugi* with *imprimens*. Theobald (1910a: 21) originally described *suknaensis* which was later synonymized by Edwards (1922b: 467) with *imprimens*; however, Barraud (1928a: 663) questioned this synonymy and thought *suknaensis* was possibly synonymous with *caecus*. Later Edwards (1932: 170) also questionably listed *suknaensis* with *caecus* and Barraud (1934: 257) unequivocally synonymized *suknaensis* with the latter species. This arrangement was followed by Stone et al. (1959: 191) but Reinert (1973: 28), while working on the subgenus *Aedimorphus*, transferred *suknaensis* to the subgenus *Edwardsaedes* and questionably included it with *imprimens*. After examining the types and numerous specimens from a wide geographical range I believe *suknaensis* and *imprimens* are conspecific.

The correct date of publication for *imprimens* is 1860 and not 1861 as reported by previous workers.

TYPE-DATA. The holotype female of *imprimens* in the BMNH bears the following information on the labels: *imprimens*; type; Amb. [Amboyna]; Saunders, 68-4; *Culex imprimens* Walk., Identified as the type by E. A. Waterhouse. Walker (1860: 144) identified the location as Amboyna and the collector as A. R. Wallace. The holotype male of *brugi* in the BMNH possesses the following information on the labels: *Aedes (Banksinella) brugi* Edw.; S. New Guinea: Merauke, 1922, Dr. S. L. Brug [collector], B. M. 1923-433; holotype. The holotype female of *suknaensis* is in the Indian Museum, Calcutta, India and bears the following information on the labels: Sukna, 500 feet, E. Himalayas, 2-VII-08, In the dense jungle; cotype F. V. T. A female paratype in the BMNH contains the same information as the holotype except for the additional following data: flies and bites by day, N. A., 1909-272, and T75.7 (genitalia preparation number). Theobald (1910a: 21) records the collection district as Darjiling and the collector as Annandale for the types of *suknaensis*. The female syntype specimens of Leicester's (1908: 153) *Culex Auratus* are apparently lost. They could not be found in the BMNH.

DISTRIBUTION. 715 specimens examined: 383♀, 91♂, 2 p, 4 l, 142 L, 57 with associated skins (22 p, 35 pl, 1 l incomplete).

CAMBODIA. *Kompong Sela*, Stung Chral; 6♀, 4♂, 2L.

INDONESIA. *Kalimantan*, Mahakkam; 1♀. *Moluccas*, *Amboina Is.*; 1♀ (holotype of *imprimens*), *Ceram*, Toem, Warasiwa; 7♀, 1♂. *Sumatra*, Dermajoe, Moeara Tebo; 4♀. *West Irian*, Hollandia, Maffin Bay, Nabire, S. Geelvink Bay, Sansifor, Vogelkop, Kebar Valley west of Manokwari; 10♀, 1♂ l, 17♂, 34 L, Merauke; 1♂ (holotype of *brugi*).

INDIA. *Assam or Bengal*; 1♀. *Bengal*, Darjeeling Dist., Sukna; 1♀ (paratype of *suknaensis*). *Andhra*, Musalimadugu Forest Reserve; 3♂.

JAPAN. Akigase, Nagano Pref., Norikura-Kagen, *Honshu*, Omiya; 8♀.

MALAYSIA. *Sabah*, Keningau; 1♀. *Sarawak*, Kuching; 1♀. *Selangor*, Ulu Gombak, Ulu Langat; 7♀, 1 lp, 2 l.

PAPUA-NEW GUINEA. Finschhafen, Huon Peninsula, Gusika, Bougainville Is., Rauna Plantation, Lae, Milne Bay, Murua near Kerema, S. Vanapa River 3 km, Morobe Dist., Wau, Mt. Missim, Sepik Dist., Wewak, West Highlands, Ming, Gum Hamlet, Goodenough Is., Watutu Pt., Kiriwina Is.; 2♀ pl, 71♀,

3♂ p, 40♂, 38 L.

PHILIPPINE ISLANDS. *Mindanao Is.*, Ft. Pikit; 1♀. *Mindoro Is.*, San Jose; 2♀, 2♂, 1 p, 2 l. *Palawan Is.*, Puerto Princesa; 4♀. *Tawi Tawi Group*, *Sulu*, Sanga Sanga Is., Lapit-Lapit; 1♀.

SOLOMON ISLANDS PROTECTORATE. *Guadalcanal Is.*, Belasuma R., Flu, Gold Ridge, Honiara, Nini Creek (35 km SE. of Honiara), Roroni (35 km E. of Honiara), 25 km SSE. of Honiara, Koli Ar., Marovovo, Ruavatu Est., Teneru Ar.; 163♀, 5♂. *New Georgia Group*, Rendova Is., 4♀. *Russell Is.*, Pavuvu Is.; 1♀. *San Cristobal Is.*, Arohane; 4♀.

THAILAND. *Chiang Mai*, Amphoe Muang, Huey Chang Kien; 1♀. *Chon Buri*, Amphoe Bang Lamung, Khao Mai Keo; 1♀. *Kanchanaburi*, Ban La Wa, Ban Nong Phang Kung, Ban Sai Yok, Huai Mae Nam Noi; 26♀ pl, 10♀ p, 7♀, 4♂ p, 1♂, 56 L. *Khon Kaen*, Amphoe Chun Phae, Pha Dong Larn, Tham Pho Ti Yan; 8♀. *Lampang*, Huai Mae Phrao; 4♀ pl. *Nakhon Ratchasima*, Amphoe Pak Chong, along Lam Nam Tha Khlong; 19♀, 2♂. *Nakhon Si Thammarat*, Amphoe Chawang, Banna Nabon, Ban Tha Phae, Khao Luang; 2♀. *Nan*, Ban Ta Loc; 2L. *Songkha*, Amphoe Haad Yai, near Ton Nga Chang Waterfalls; 2♀ pl, 4♀ p, 1♂ pl, 9 L. *Tak*, Khao Salak Phra; 1♀ p. *Ubon Ratchathani*, Chongmek; 1♀. *Udon Thani*, Amphoe Muang, Ban Kau Noi; 1♀.

VIETNAM. *Binh Dinh*, An Khe, Qui Nhan; 1♀, 1 L.

Distribution from literature.

AUSTRALIA. North of Coen (Marks 1972: 106).

INDIA. E. Himalayas, Darjiling Dist., Sukna (Theobald 1910a: 21); Assam, Dibrugarh, Dimapur, Golaghat; Bengal (Barraud 1928a: 664).

INDONESIA. Amboina (Theobald 1901: 422, 1910b: 350), Merauke (Edwards 1924: 377); Borneo (Edwards 1922b: 467); Java, Weltevreden; New Guinea (Brug and Haga 1923: 639); Sumatra, Djambi, Kotta Tjane, Moeara Tebo (Brug and Edwards 1931: 258); Ceram (Bonne-Wepster and Brug 1937: 38, Bonne-Wepster 1954: 239); New Guinea, Cyclops Mts., Hollandia (Knight and Hull 1953: 468); Hollandia area (Assem 1961: 24); Kalimantan, Mahakkam; Java, Gombong, Modjavarno, Padaherang, Tasikmalaja, Tilaljav; Sumatra, Atjeh, Dermajoe (Mattingly 1961: 54); Moluccas; New Guinea, Kaimana, Manokwari (Assem and Bonne-Wepster 1964: 99).

JAPAN. Hokkaido; Kyushu (Yamada 1927: 571, Hsiao and Bohart 1946: 22); Honshu, Sendai area (Waku 1950: 72); Kyushu (LaCasse and Yamaguti 1950: 104); Hokkaido, Urawa (Hara 1957a: 65); Kanayawa, Ohmura (Kurihara 1963: 196); Saitawa-ken, Kitaurakazu (Moriya et al. 1973: 54).

KOREA. Kwang-Ju Airbase, Osan Airbase (Reisen et al. 1971: Table 26).

MALAYSIA. (Leicester 1908: 153); Selangor, Ulu Gombak (Macdonald 1957: 21), Sarawak, Kuching (Mattingly 1961: 54).

PAPUA-NEW GUINEA. Solomon Is., New Britain (Iyengar 1955: 30), Bougainville (Belkin 1962: 411, Peters and Christian 1963: 54); New Guinea, north, east and south coasts, Sepik area (Peters and Christian 1963: 54); Bismarck Arch. (Steffan 1966: 213).

PHILIPPINE ISLANDS. Mindanao, Port Banga (Edwards 1929: 5); Mindanao, Ft. Pikit; Mindoro, San Jose; Palawan, Puerto Princesa (Knight and Hull 1953: 468).

SOLOMON ISLANDS PROTECTORATE. Solomon Is. (Edwards 1925: 257, Knight et al. 1944: 52), Guadalcanal (Edwards 1924: 377); Kookoom, Ilu (Paine in Paine and Edwards 1929: 306); Russell Group, Pavuvu (Knight and Hull 1953: 468); Guadalcanal, New Georgia (Belkin 1962: 411).

THAILAND. Chieng Moeang (Causey 1937: 413).

VIETNAM. Cam Rahn Bay (Parrish 1968: 12, 1969: 554); Phu Cat Airbase

(Reisen et al. 1971: Table 13).

BIONOMICS. In Thailand immatures were collected from small and large flood pools containing clear or turbid, fresh, unmoving, temporary water in unshaded to moderately shaded areas located in bamboo forests (3 times), teak groves (twice), rainforests (twice), secondary deciduous forest (once) and a rubber plantation (once), in valley, plain, hilly and mountain terrain and at elevations of 76-854 m (most often near 120 m). In New Guinea larvae were collected from water in a shellhole, in South Vietnam from water in a foxhole and in Indonesia from water in a temporary puddle.

Females in Thailand have been taken biting man between 1400-2100 hours in bamboo groves and forests with light vegetation. In India females were taken biting man during the day in the deep jungle and in Japan they have been collected resting in bamboo groves. Females were collected biting man and animals at 1200-1300 hours in Cambodia and biting man in the jungle in the Philippine Islands and Solomon Islands. In New Guinea adults have been taken at elevations from sea level to 1200 m.

Immatures have been collected from: a buffalo wallow on a high plateau in Thailand (Causey 1937: 413); in transient ground water pools in the jungle (Assem 1961: 24) and temporary pools in half shade at the border of a rainforest in Indonesia (Bonne-Wepster 1964: 99); in temporary pools and in flowing water in flooded areas located in partial to heavily shaded areas of Papua (Steffan 1966: 213); in ground pools in a forest in Japan (Waku 1950: 72); and in the Solomon Islands in partly shaded leafy woodland pools (Bohart 1945: 63) and in temporary pools of a very transient nature usually located in the jungle (Belkin 1945: 6). Eggs are laid singly, are not cemented to objects (Belkin 1962: 410), require drying for 4-6 weeks (Belkin 1945: 6), hatching taking place when the shallow jungle depressions in which they lie are flooded by rain and the resulting larvae complete their development within 3 days and are apparently capable of withstanding some desiccation (Laird 1956: 39).

Adults have been collected: aggressively biting in deep shade during the day in the Philippine Islands (Bohart 1945: 63); in biting collections (Macdonald 1957: 21, Macdonald and Traub 1960: 100) and in the jungle, common in some places but very local (Leicester 1908: 154) in Malaysia; attacking humans during the day in forest or brush areas in the mountains of Japan (Waku 1950: 72); readily biting man during the daytime (Steffan 1966: 213) and in New Jersey light traps in the lowlands of New Guinea (Peters *in* Peters and Christian 1963: 59, 74); in houses, stables and in the woods (Bonne-Wepster 1954: 239) and biting man in Indonesia (Assem and Bonne-Wepster 1964: 99); in light traps during June and July in Korea (Reisen et al. 1971: Table 26); in light traps during May and June in South Vietnam (Parrish 1968: 12, Reisen et al. 1971: Table 13); biting in numbers during the day in and near jungle areas, the females being capable of biting through heavy clothing and attack readily in the shade and at dusk (Belkin 1945: 6), biting man in the foothill areas (Belkin 1962: 411), feeding on man in large numbers by day, readily biting through the shirt and stockings, occurring occasionally in marginal parts of plantations, but were absent at a distance of more than 300-400 yards from forest margin in the Solomon Islands (Paine *in* Paine and Edwards 1929: 306); and in the dense jungle biting during the day in India (Theobald 1910a: 22).

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LIST OF FIGURE ABBREVIATIONS

Female Genitalia

AGDuB	= Accessory gland duct base	LVL	= Lower vaginal lip
BMA	= Basal median apodeme	PGL	= Postgenital lobe
Ce	= Cercus	SCa	= Seminal capsule
DPGL	= Line of attachment of perianal membrane to dorsal surface of PGL	SCaP	= Seminal capsule pore
		Tu	= Tuberculus
H	= Hinge	UVL	= Upper vaginal lip
I	= Insula	UVS	= Upper vaginal sclerite
IX-Te	= Tergum 9	VIII-S	= Sternum 8
		VIII-Te	= Tergum 8

Male Genitalia

Ae	= Aedeagus	IX-Te	= Tergum 9
AG	= Apodeme of gonocoxite	PaA	= Parameral apodeme
BML	= Basal mesal lobe	Par	= Paramere
Ce	= Cercus	Ppr	= Paraproct
Gc	= Gonocoxite	Pr	= Proctiger
Gs	= Gonostylus	VIII-S	= Sternum 8
IX-S	= Sternum 9	VIII-Te	= Tergum 8
		X-Te	= Tergum 10

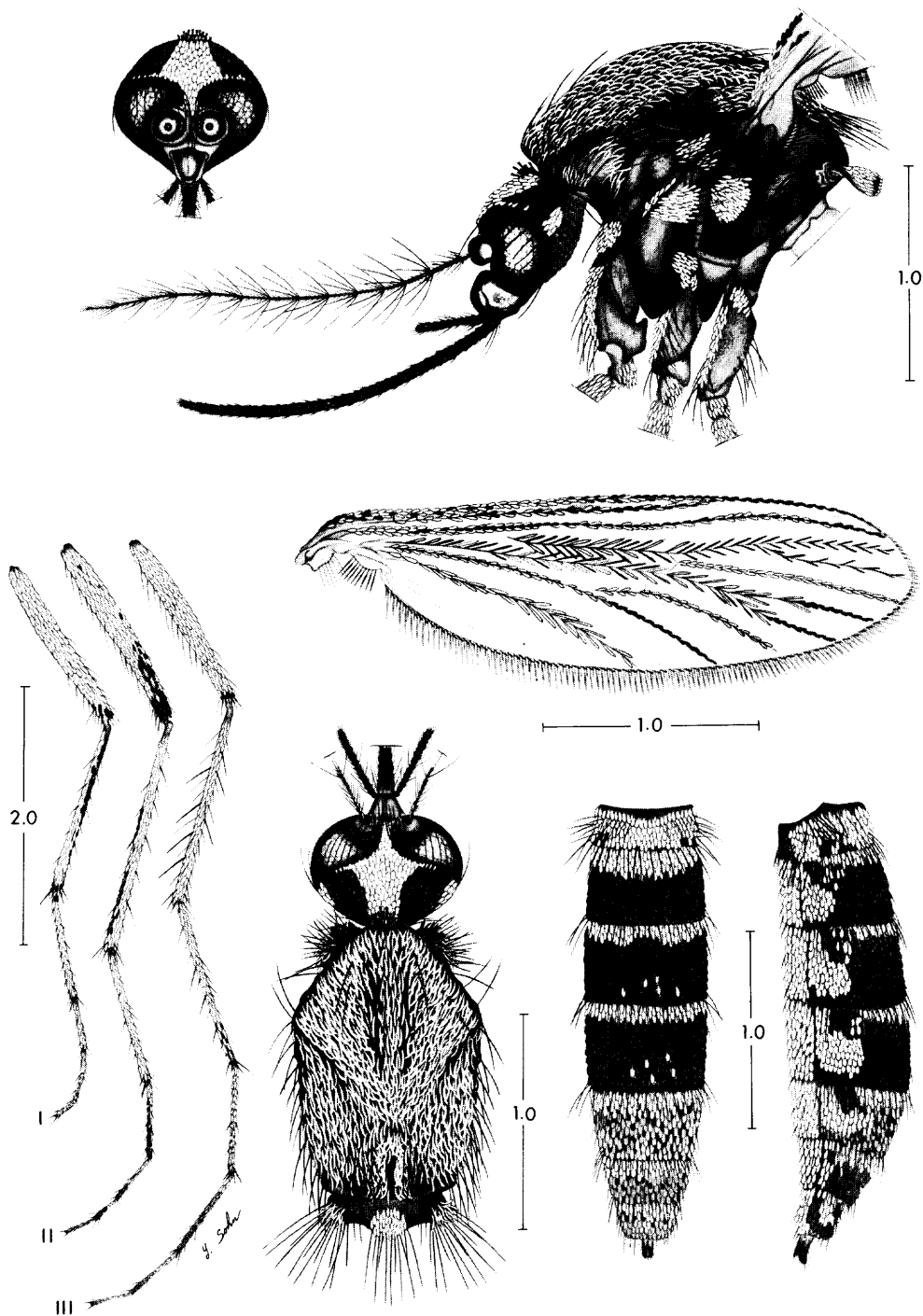
Pupa

CT	= Cephalothorax	MP	= Metanotal plate
I-VIII	= Abdominal segments 1-8	P	= Paddle
		T	= Respiratory trumpet

Larva

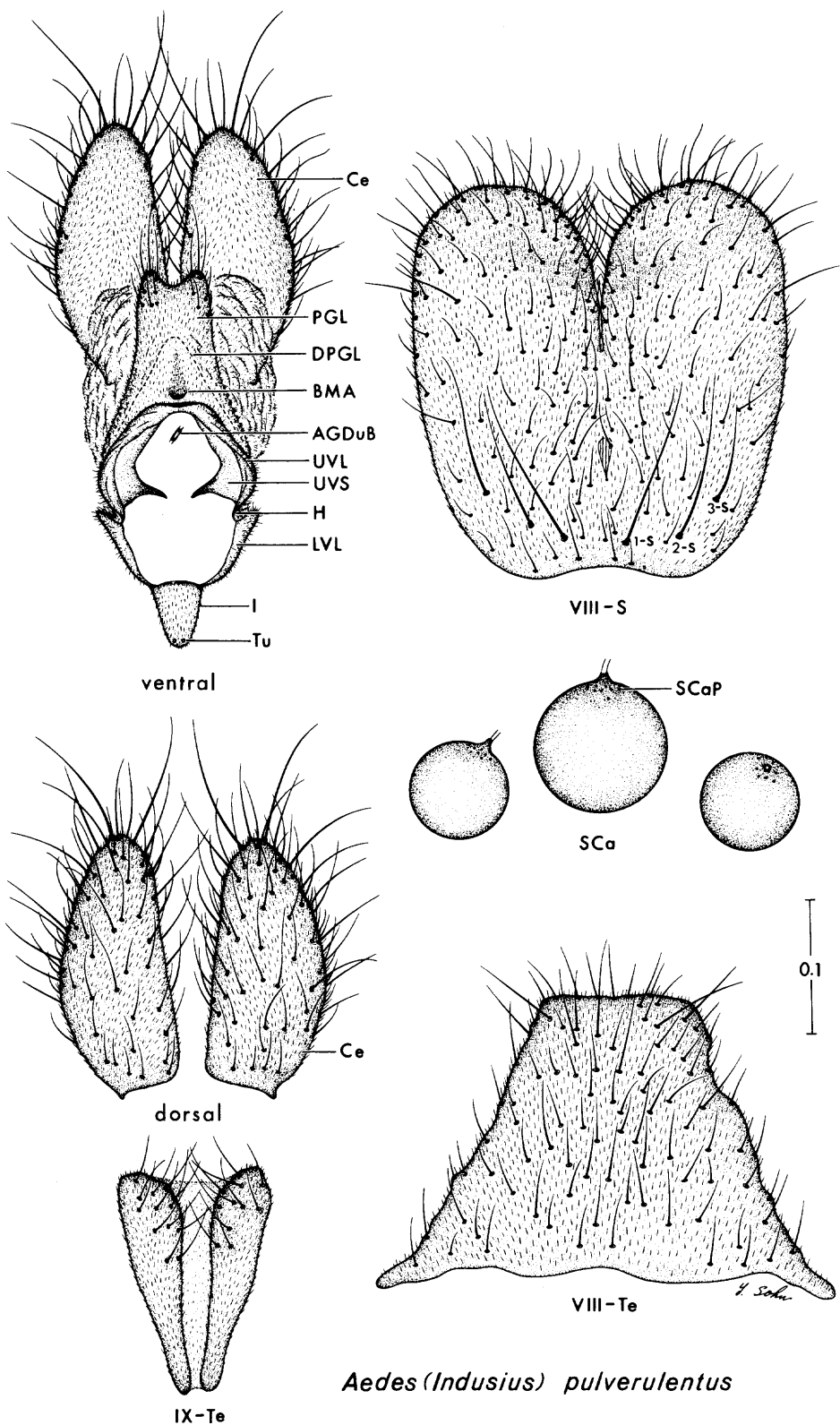
A	= Antenna	M	= Mesothorax
C	= Head	MP	= Mouthpart
CS	= Comb scale	P	= Prothorax
Dm	= Dorsomentum	PT	= Pecten tooth
I-VIII, X	= Abdominal segments 1-8, 10	S	= Siphon
		T	= Metathorax

Fig.1



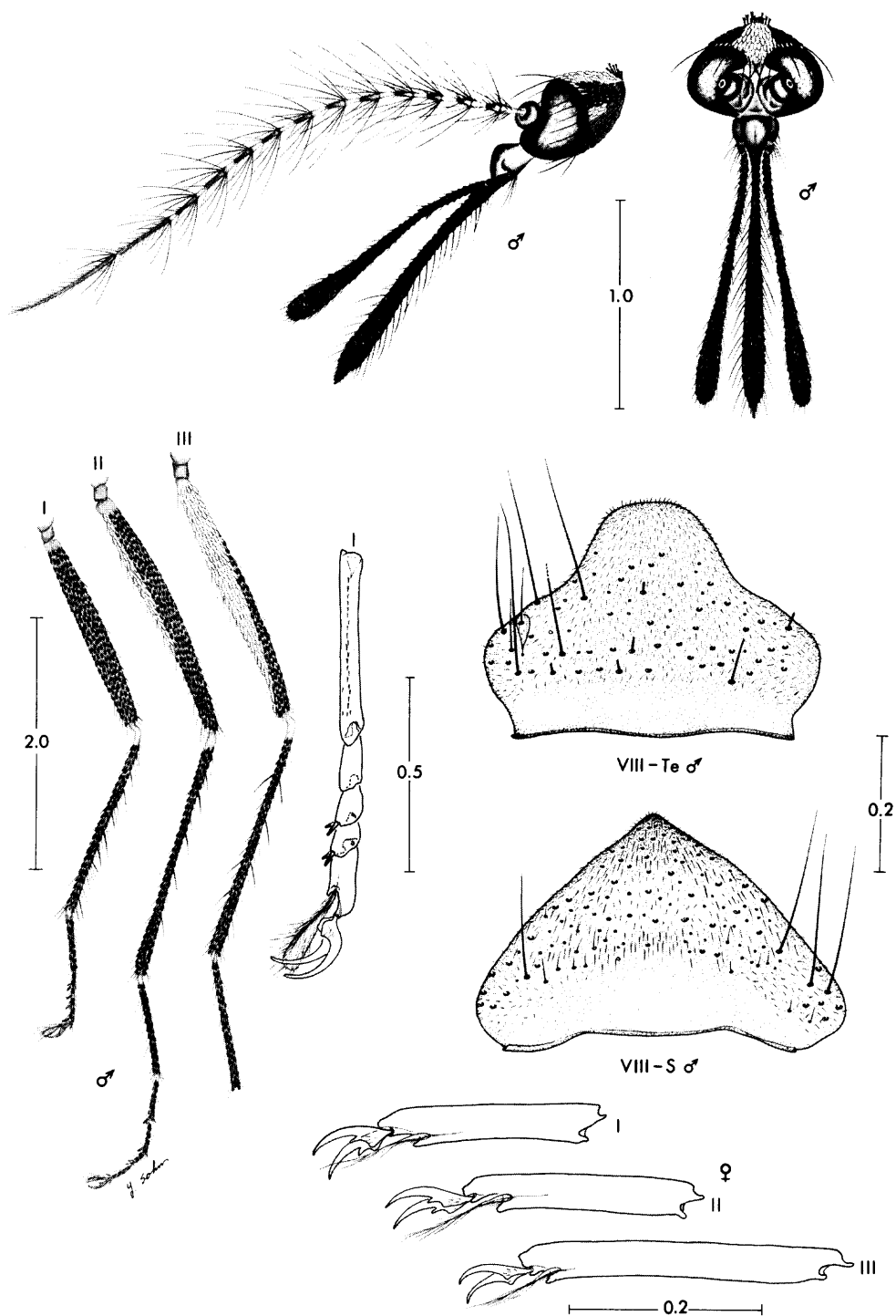
Aedes (Indusius) pulverulentus ♀

Fig. 2



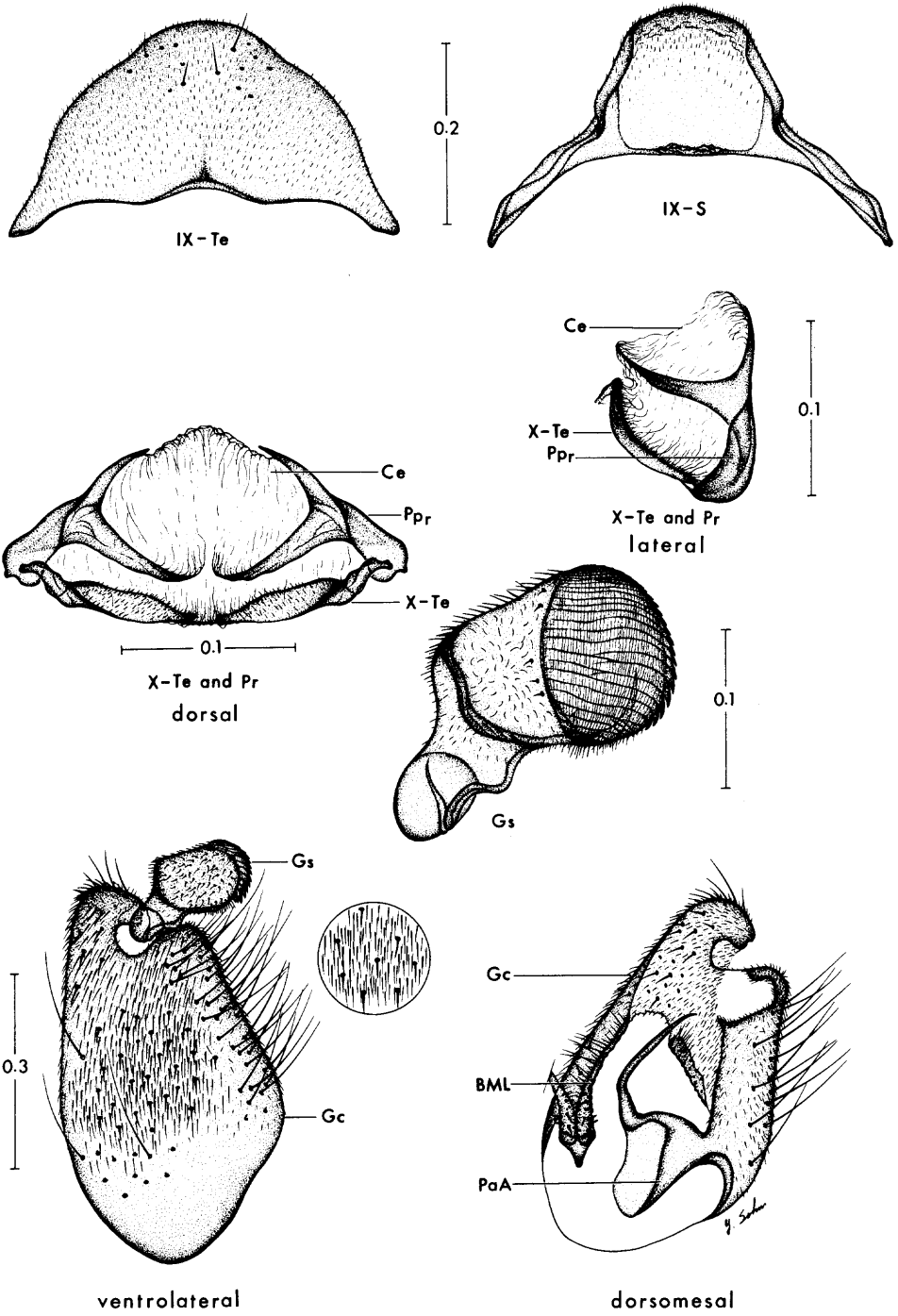
Aedes (Indusius) pulverulentus

Fig. 3



Aedes (Indusius) pulverulentus

Fig. 4



Aedes (Indusius) pulverulentus

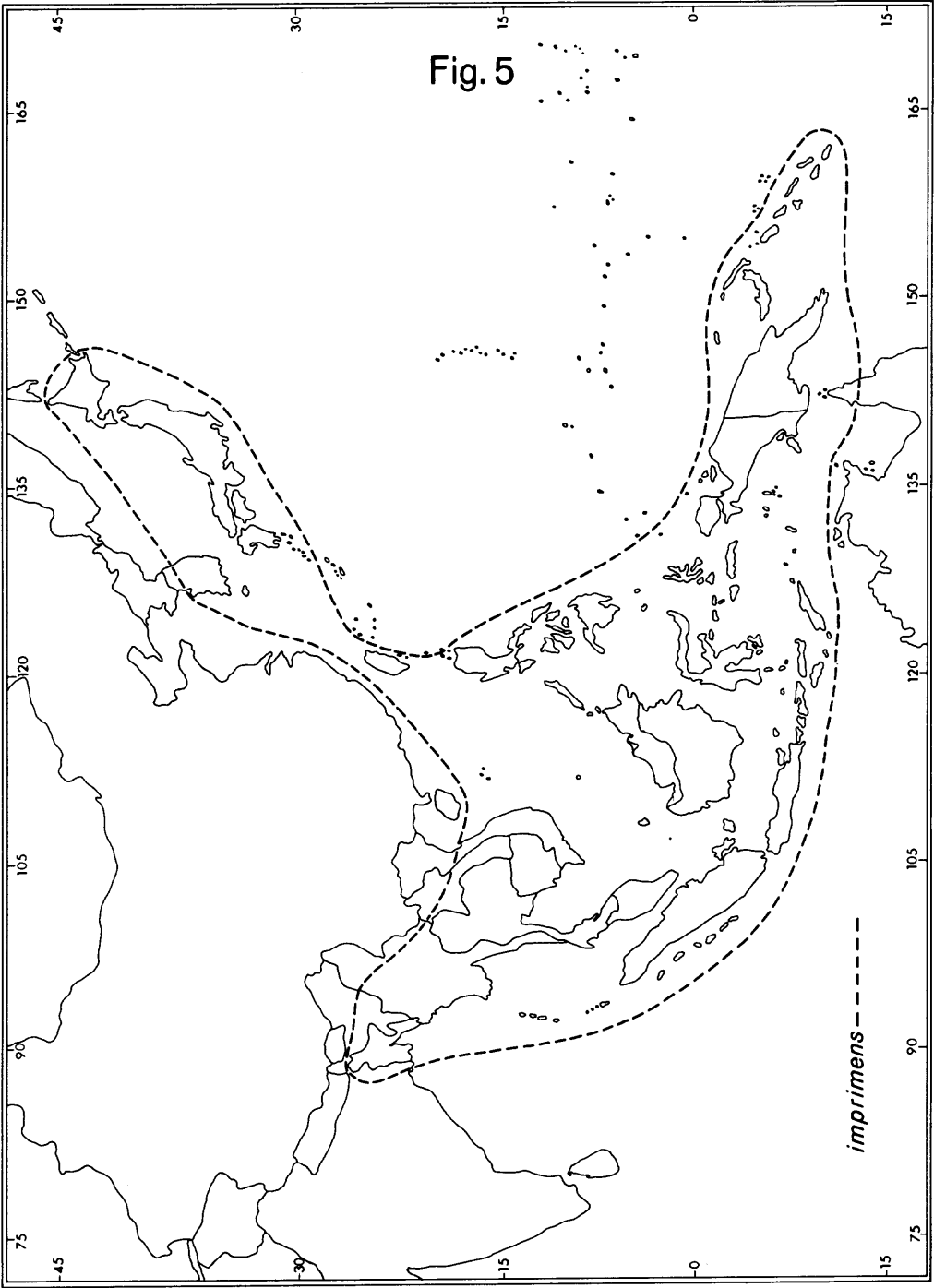
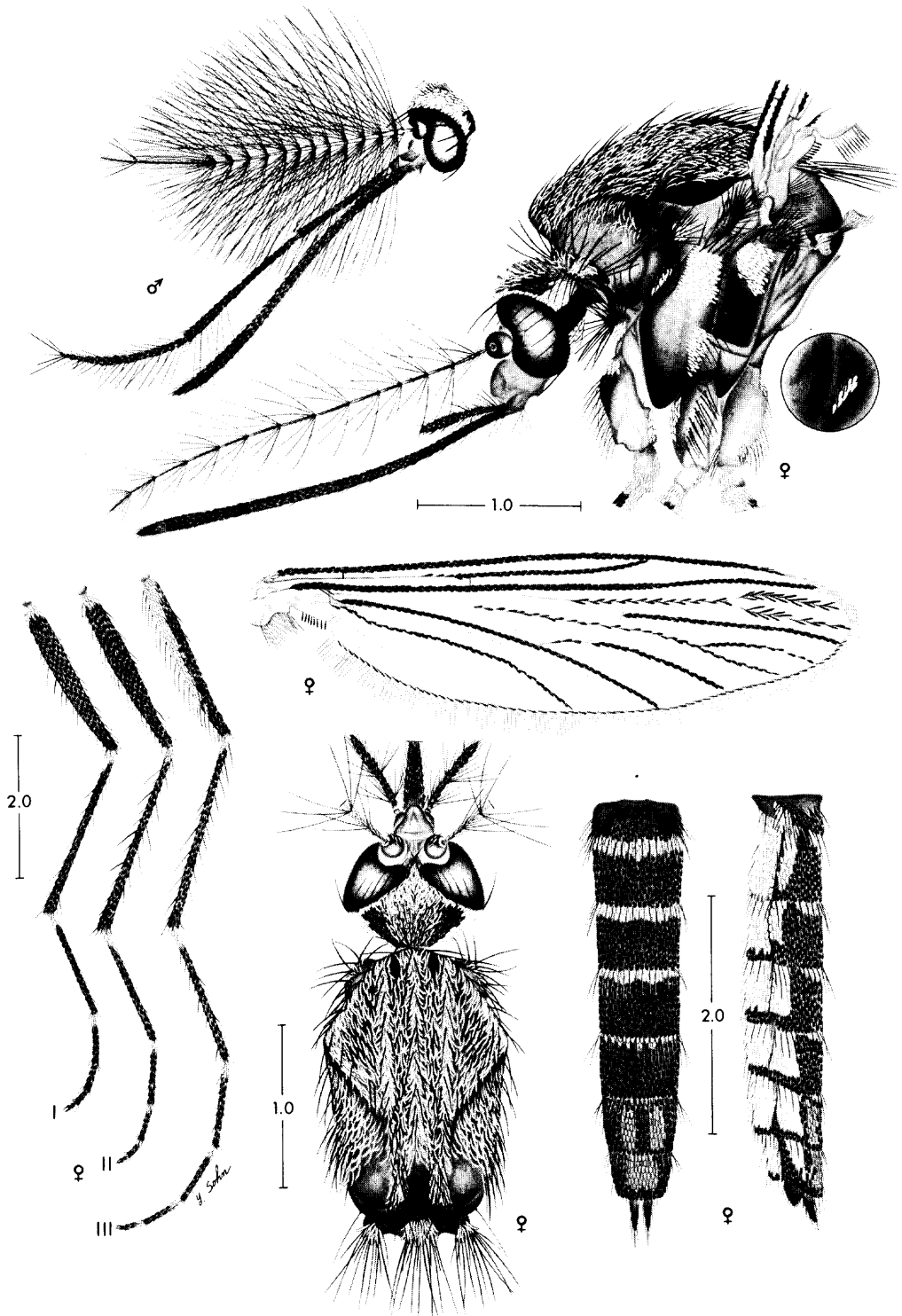


Fig. 6



Aedes (Edwardsaedes) imprimens

Fig. 7

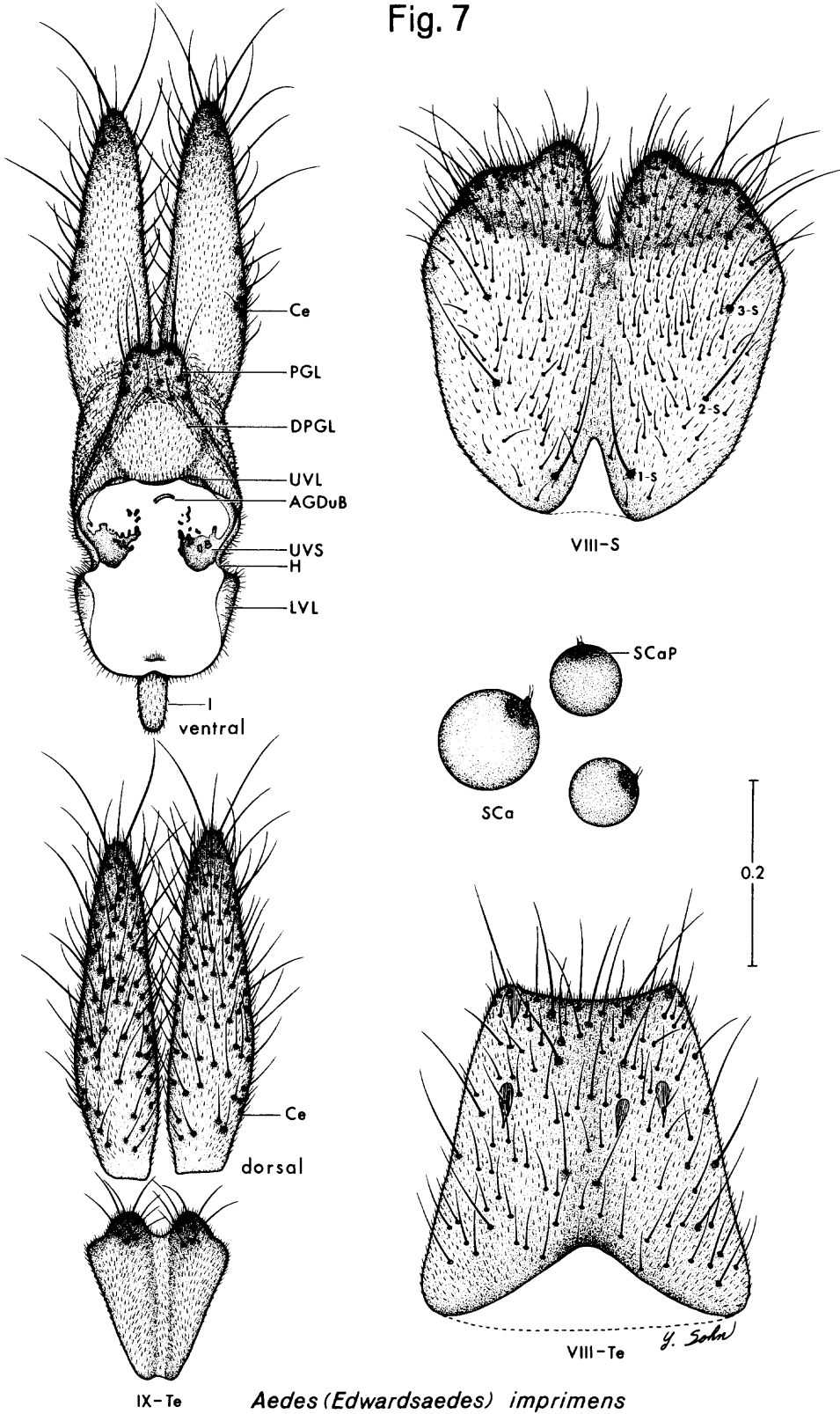
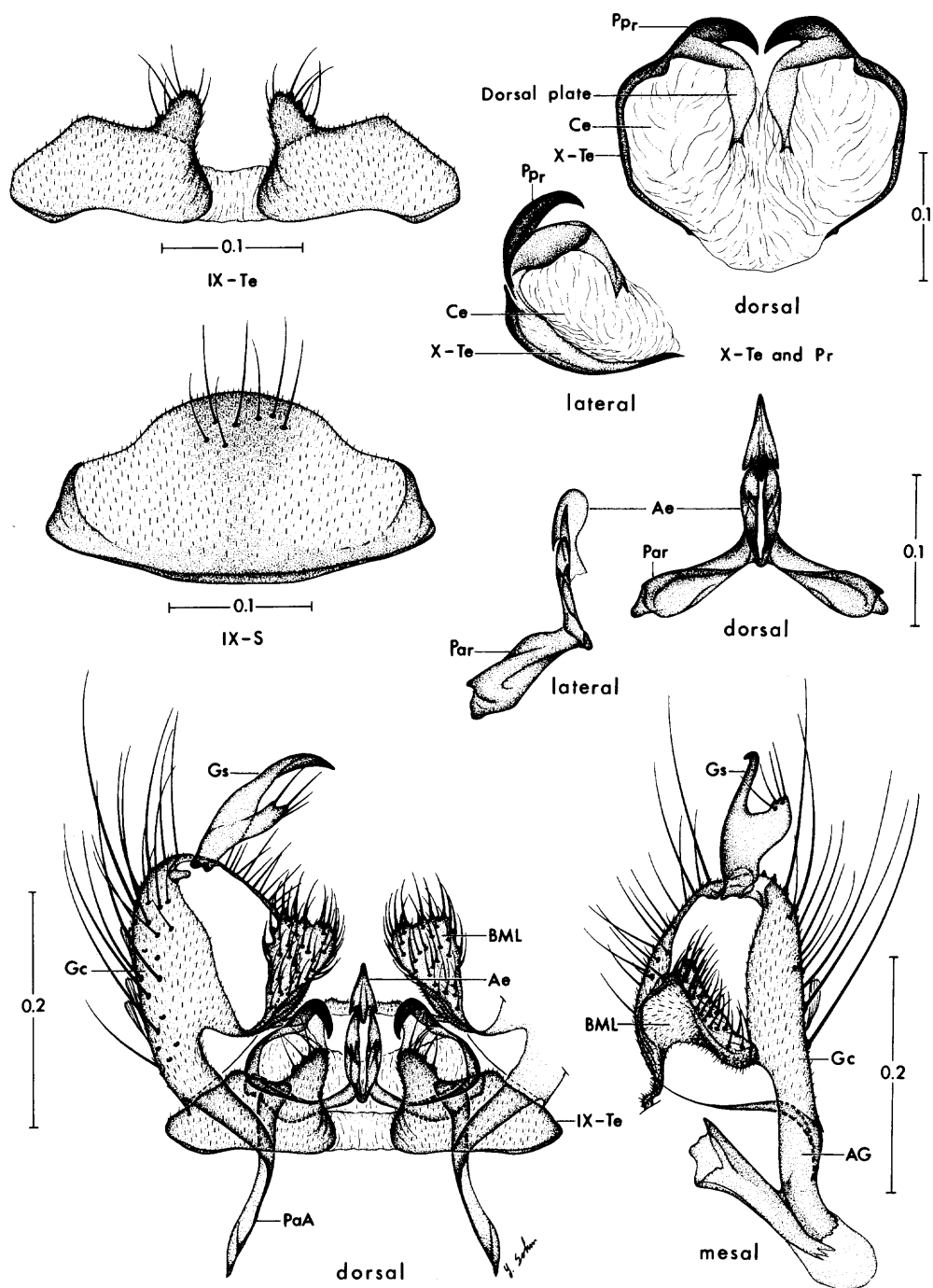
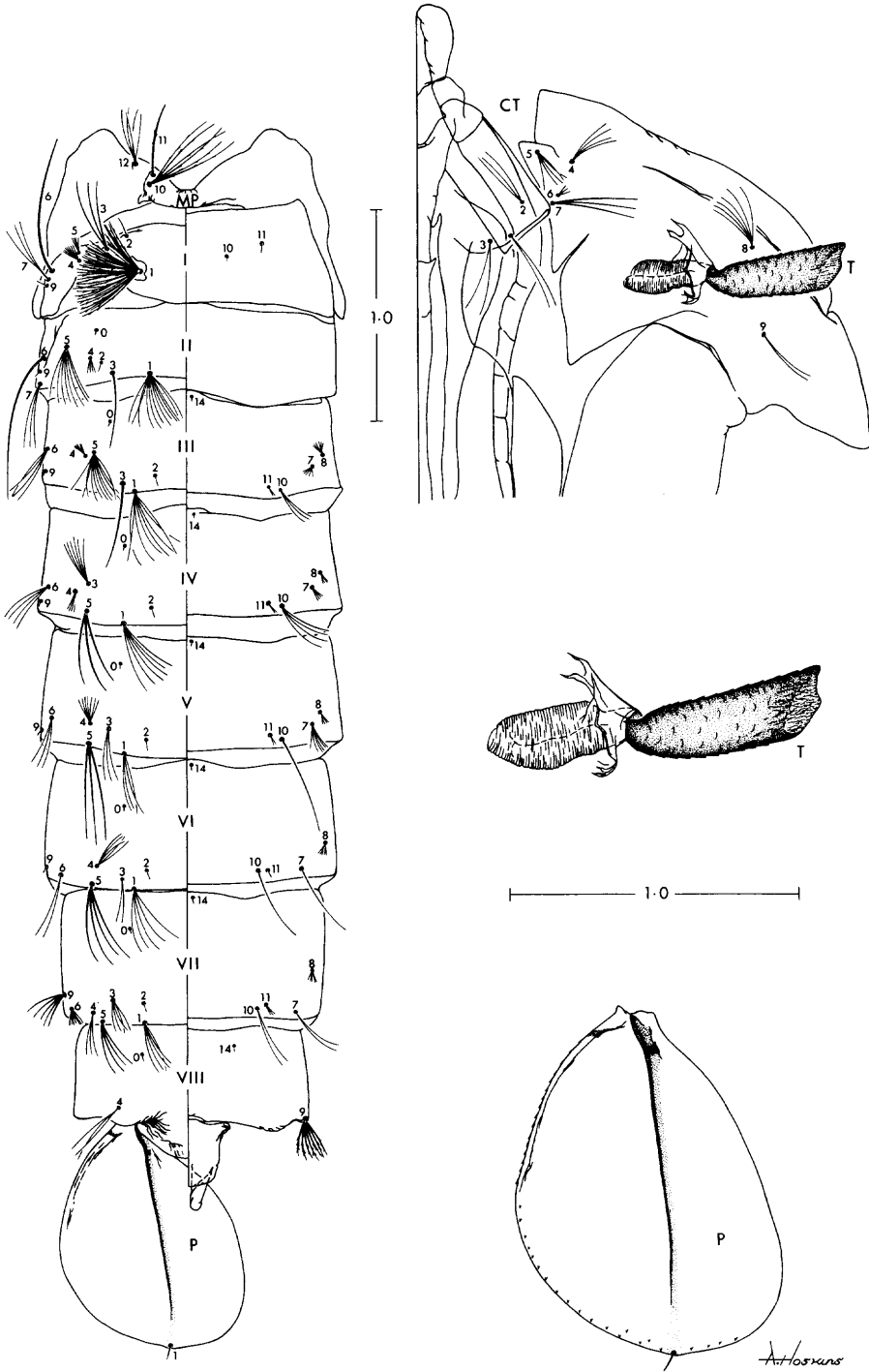


Fig. 8



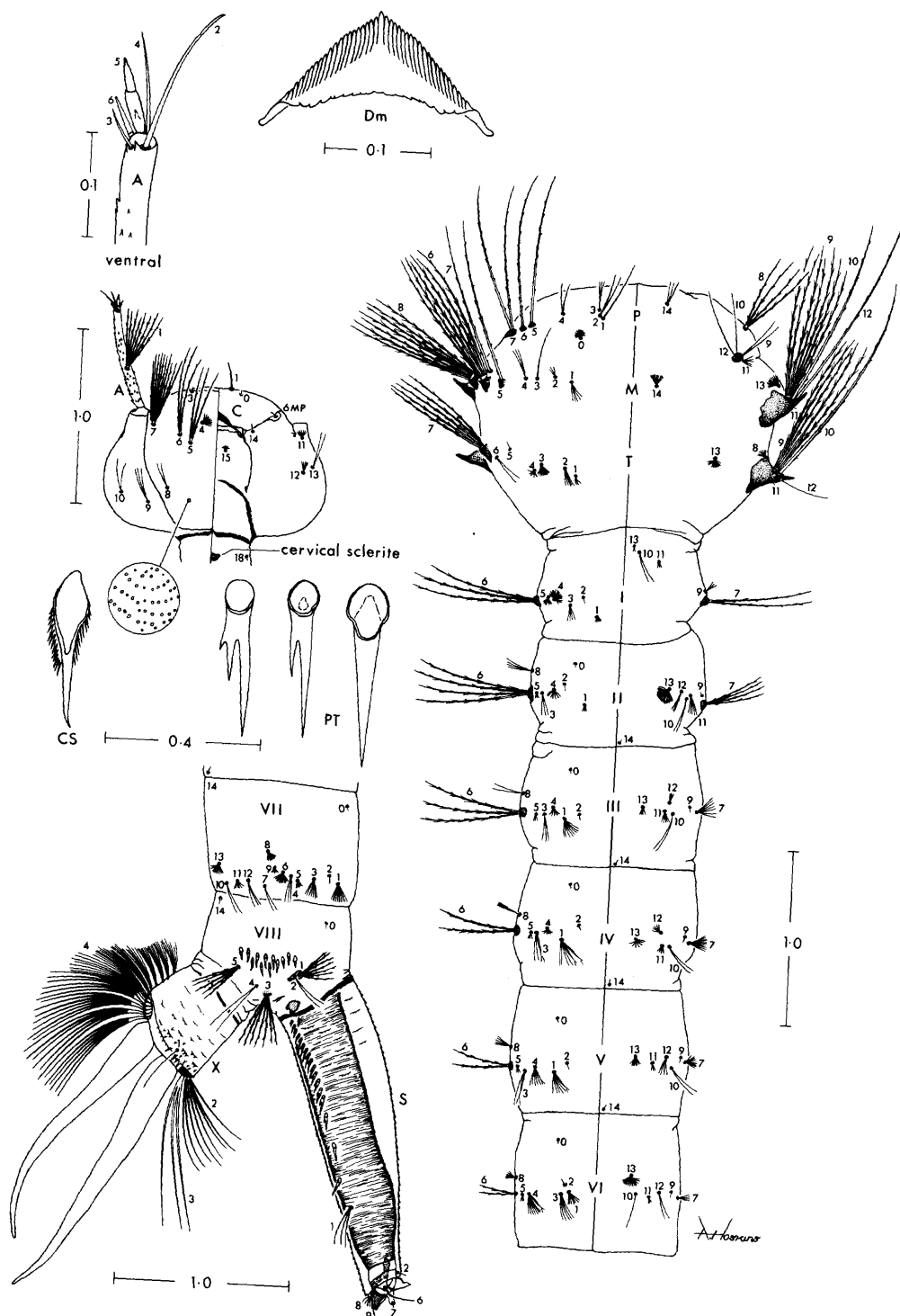
Aedes (Edwardsaedes) imprimens

Fig. 9



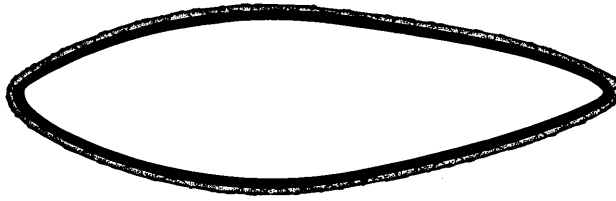
Aedes (Edwardsaedes) imprimens

Fig. 10



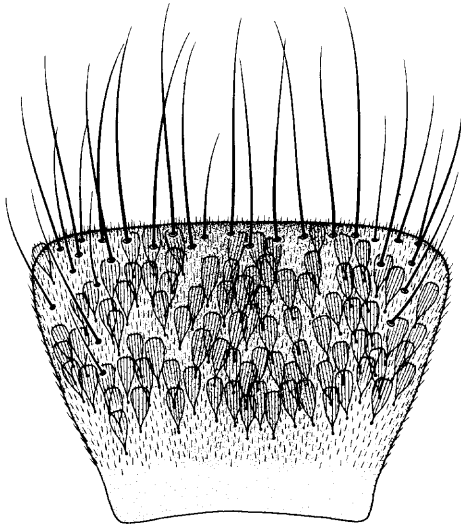
Aedes (Edwardsaedes) imprimens

Fig.11

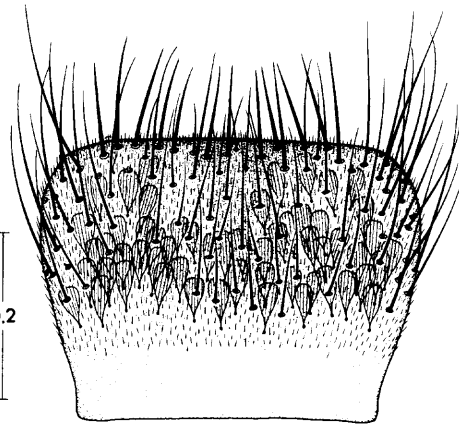


0.5

Egg (outline, dorsal)

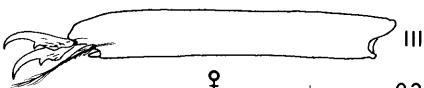
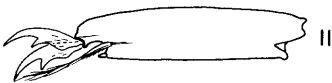


VIII-S ♂

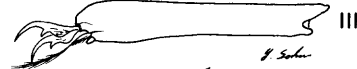


VIII-Te ♂

0.2



♀



♂

Tarsomeres 5 and Posttarsi

0.2

Aedes (Edwardsaedes) imprimens

APPENDIX: TABLE 1. Record of the branching of the setae on the pupae of *Aedes (Edwardsaedes) imprimens* (10 specimens)

Seta	Range	Mode	Seta	Range	Mode	Seta	Range	Mode
Cephalothorax			Abdomen I (Cont.)			Abdomen IV		
1	2	2	11	1	1	0	1	1
2	2-3	3	Abdomen II			1	3-6	5
3	2	2	0	1-2	1	2	1	1
4	2-5	4	1	6-13	12	3	6-8	6
5	4-8	4	2	1	1	4	3-8	4
6	2-6	3	3	1-2	1	5	3-5	4
7	3-6	4	4	5-11	7	6	2-4	4
8	5-13	7	5	8-12	8	7	2-5	4
9	2-3	2	Abdomen III			8	3-5	4
Metanotal Plate			0	1	1	9	1	1
10	3-6	5	1	5-12	7	10	2-4	3
11	1	1	2	1-2	1	11	1-3	2
12	4-8	5	3	1	1	14	1	1
Abdomen I			4	3-8	5	Abdomen V		
1	21-37	26	5	9-16	9	0	1	1
2	1-2	1	6	2-4	3	1	3-7	5
3	2-6	3	7	3-7	5	2	1-2	1
4	6-16	11	8	4-6	5	3	2-3	3
5	3-6	4	9	1	1	4	4-9	7
6	1-2	1	10	2-4	3	5	3-4	3
7	2-4	3	11	2-4	2	6	2-3	2
9	1-3	1	14	1	1	7	2-8	6
10	1	1				8	3-5	5

TABLE 1 (Cont.).

Seta	Range	Mode	Seta	Range	Mode	Seta	Range	Mode
Abdomen V (Cont.)			Abdomen VI (Cont.)			Abdomen VII (Cont.)		
9	1	1	8	3-5	5	7	1-2	1
10	1-3	2	9	1	1	8	4-6	5
11	2-4	1	10	1-2	1	9	3-5	4
14	1	1	11	1-4	1	10	1-2	1
Abdomen VI			14	1	1	11	2-5	4
0	1	1	Abdomen VII			14	1	1
1	4-7	5	0	1	1	Abdomen VIII		
2	1-2	1	1	3-7	5	0	1	1
3	2-3	2	2	1	1	4	2-4	3
4	4-7	5	3	3-8	6	9	6-10	8
5	3-4	3	4	2-3	3	14	1-2	1
6	1-3	2	5	2-5	4	Paddle		
7	1-2	1	6	4-8	5	1	1-2	1

APPENDIX: TABLE 2. Record of the branching of the setae on the larvae of *Aedes (Edwardsaedes) imprimens* (10 specimens)

Seta	Range	Mode	Seta	Range	Mode	Seta	Range	Mode
Antenna			Prothorax (Cont.)			Mesothorax (Cont.)		
1	5-12	8	3	2-3	3	12	1-2	1
Head			4	2-3	2	13	7-12	10
0	1	1	5	1-2	1	14	8-11	8
1	1	1	6	1	1	Metathorax		
3	1	1	7	2-4	2	1	2-4	3
4	6-10	9	8	2-4	3	2	2-5	5
5	3-6	3	9	1-3	2	3	8-19	8
6	2-5	3	10	1-2	1	4	5-9	7
7	6-14	8	11	3-5	4	5	1	1
8	2-3	2	12	1	1	6	1-2	1
9	2-3	3	14	2-3	3	7	5-9	7
10	2-4	2	Mesothorax			8	7-11	8
11	6-12	7	1	3-5	4	9	3-5	4
12	3-6	3	2	2-7	3	10	1	1
13	2-3	2	3	1-3	1	11	1	1
14	1-3	2	4	2-4	3	12	1	1
15	3-6	6	5	1	1	13	9-14	13
18	1	1	6	4-6	5	Abdomen I		
6MP	1	1	7	1	1	2	1-2	1
Prothorax			8	5-8	5	3	4-7	4
0	8-16	12	9	4-8	7	4	13-24	20
1	1-2	1	10	1	1	5	3-6	5
2	2-3	2	11	1	1	6	2-4	3

TABLE 2 (Cont.).

Seta	Range	Mode	Seta	Range	Mode	Seta	Range	Mode
Abdomen I (Cont.)			Abdomen III (Cont.)			Abdomen IV (Cont.)		
7	2-3	2	2	1	1	10	2-3	2
9	2-4	4	3	3-5	3	11	3-4	4
10	2-3	2	4	4-9	6	12	2-6	3
11	2-5	2	5	1-4	2	13	4-7	5
13	1-2	2	6	2-3	2	14	1	1
Abdomen II			7	5-8	8	Abdomen V		
0	1	1	8	1-2	2	0	1	1
1	2-4	4	9	1-2	1	1	5-10	6
2	1	1	10	2-4	2	2	1-2	1
3	2-4	4	11	2-5	4	3	2-4	3
4	7-18	10	12	3-7	5	4	7-12	11
5	2-4	3	13	4-8	5	5	2-3	2
6	2-4	2	14	1	1	6	2	2
7	4-7	6	Abdomen IV			7	6-11	7
8	3-5	4	0	1	1	8	1-5	3
9	1-3	1	1	6-9	8	9	1-2	1
10	1-2	2	2	1-2	1	10	2-3	2
11	4-8	5	3	4-5	4	11	2-5	4
12	2-3	2	4	5-7	6	12	2-4	3
13	9-16	12	5	1-3	2	13	4-9	5
14	1	1	6	1-3	2	14	1	1
Abdomen III			7	6-11	9	Abdomen VI		
0	1	1	8	2-3	2	0	1	1
1	5-15	10	9	1-2	1	1	5-9	6

TABLE 2 (Cont.).

Seta	Range	Mode	Seta	Range	Mode	Seta	Range	Mode
Abdomen VI (Cont.)			Abdomen VII (Cont.)			Abdomen VIII (Cont.)		
2	1	1	2	1-2	1	2	2	2
3	2-5	2	3	5-10	7	3	5-10	7
4	5-10	6	4	2-5	3	4	1-2	1
5	2-3	2	5	5-8	5	5	3-6	5
6	2-3	2	6	8-18	10	14	1	1
7	3-6	5	7	2-3	2	Abdomen X		
8	4-7	7	8	5-12	5	1	1	1
9	1-2	1	9	4-5	5	2	7-8	8
10	1-2	1	10	2-3	3	3	2-5	3
11	3-5	4	11	4-6	4	Siphon		
12	2-3	3	12	2-4	3	1	2-7	4
13	10-19	12	13	6-12	6	2	1	1
14	1	1	14	1	1	7	1	1
Abdomen VII			Abdomen VIII			8	5-8	5
0	1	1	0	1	1	9	1	1
1	5-10	8	1	4-8	5			

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Valid names are set in roman type. The italicized pages are those which begin the primary treatment of the taxon. Numbers in parentheses refer to the figures illustrating the species in question.

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Paraedes 4
Psorophora 11
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Verrallina 4, 11
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vexans vexans 18

Wuchereria 12

